Single Aisle
TECHNICAL TRAINING MANUAL
T1+T2 (IAE V2500) (Lvl 2&3)
FIRE PROTECTION

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FIRE PROTECTION

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FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW

The engine and APU fire protection is done by two sub-systems: the FIRE detection system and the FIRE extinguishing system.

ENGINE AND APU FIRE DETECTION

The engines and the APU have individual fire detection systems.
Each system has two identical detection loops (A and B) installed in parallel. Each loop includes 3 detector elements.
The two loops are monitored by a Fire Detection Unit (FDU). FDU 1 monitors the loops on engine 1 and FDU 2 monitors the loops on engine 2.
The FDU sends FIRE and FAULT signals to the Flight Warning Computer (FWC) for display on ECAM.

ENGINE AND APU FIRE EXTINGUISHING

The guarded FIRE P/B switches give FIRE indication and are used to isolate the related systems. When the FIRE pushbutton is released out, the engine or APU will shut down. This also arms the extinguishing system.
Each engine has 2 fire bottles installed in the pylon.
The discharge of each bottle is controlled by a related AGENT P/BSW.
The P/B switches are on the FIRE panel on the overhead panel.
For the APU, there is only one fire extinguisher bottle, which is installed in the aft fuselage forward of the APU firewall. Its discharge is controlled by one AGENT P/BSW. On the ground, an APU FIRE will cause an automatic shutdown of the APU and an automatic discharge of the bottle.
The TEST buttons are used to do tests on the different fire detection and extinguishing systems and make sure they operate correctly.

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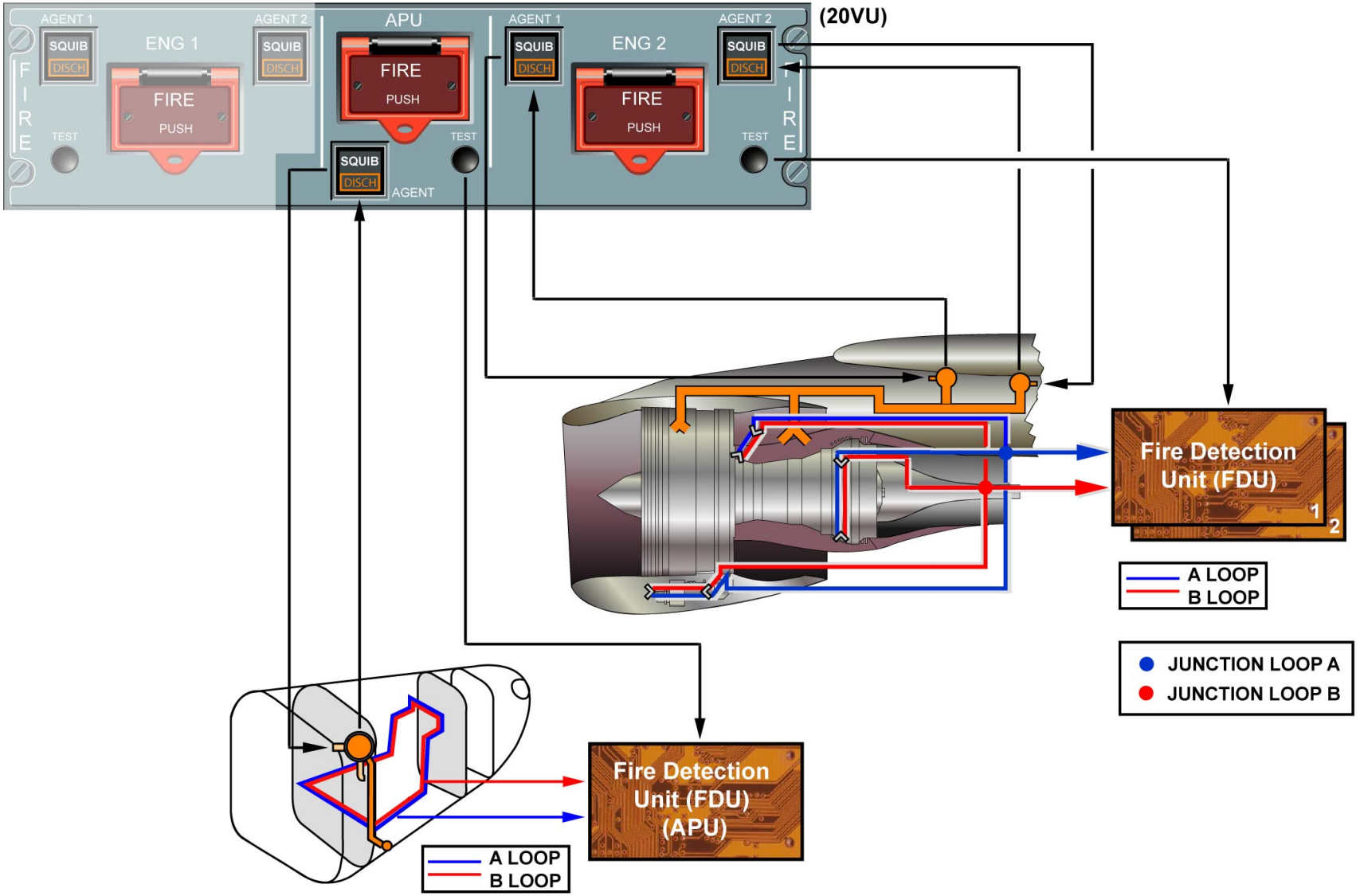


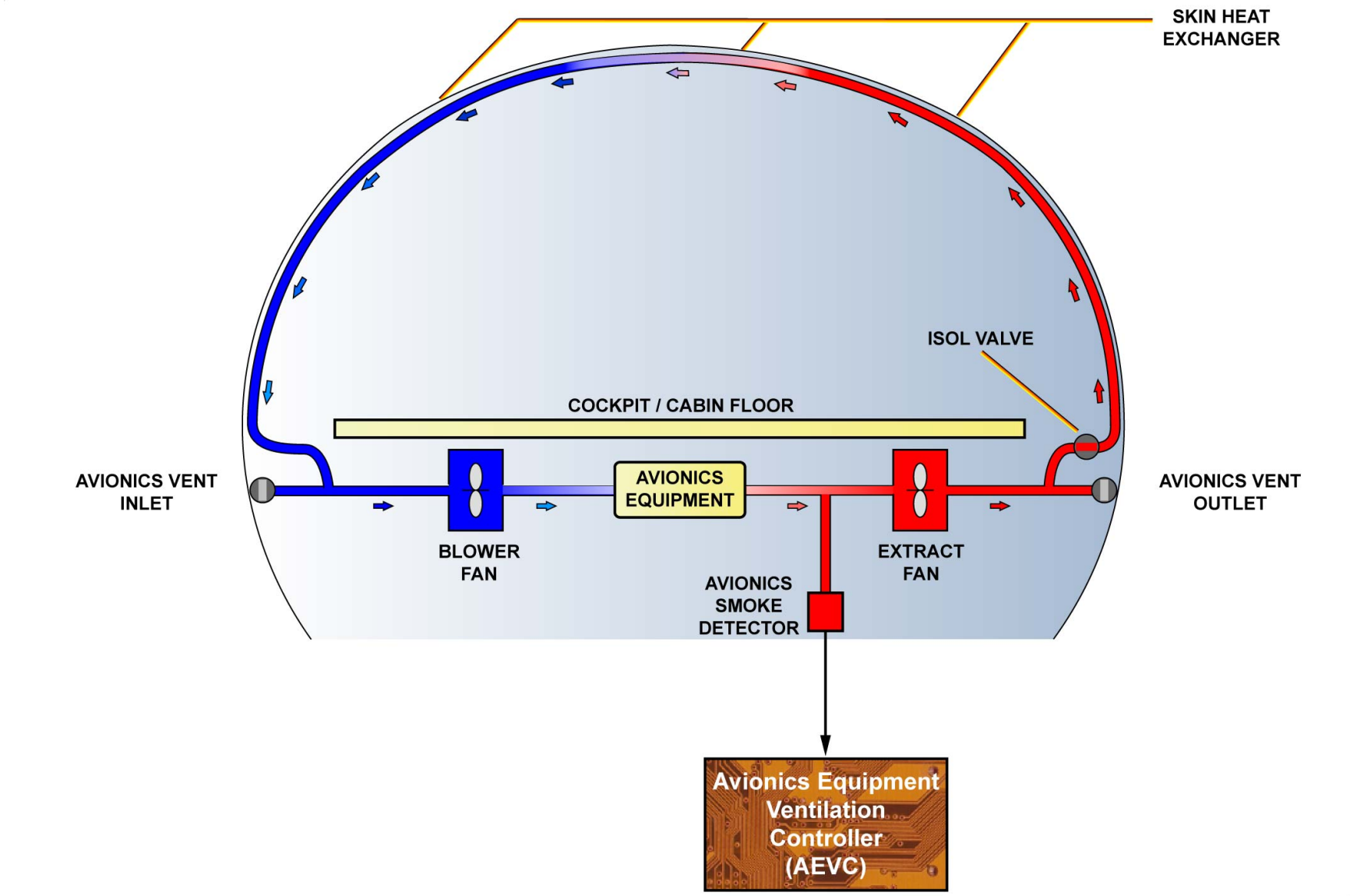
SYSTEM OVERVIEW - ENGINE AND APU FIRE DETECTION & ENGINE AND APU FIRE EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

AVIONICS SMOKE DETECTION

The A320 family aircraft have a cooling system for the avionics equipment. The cooling system is controlled and monitored by the Avionics Equipment Ventilation Controller (AEVC). The circulation of the air through the system is supplied by a blower fan (cool air supply) and an extraction fan (warm air removal).
The extraction airflow is downstream of the avionics equipment. The avionics SMOKE detector, which is installed in the extraction duct, is used for the detection of smoke from the computers and control boxes. The detector is monitored by the AEVC. The smoke detector directly sends the signal to FWC for the AVIONICS SMOKE warning in the cockpit.



SYSTEM OVERVIEW - AVIONICS SMOKE DETECTION

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

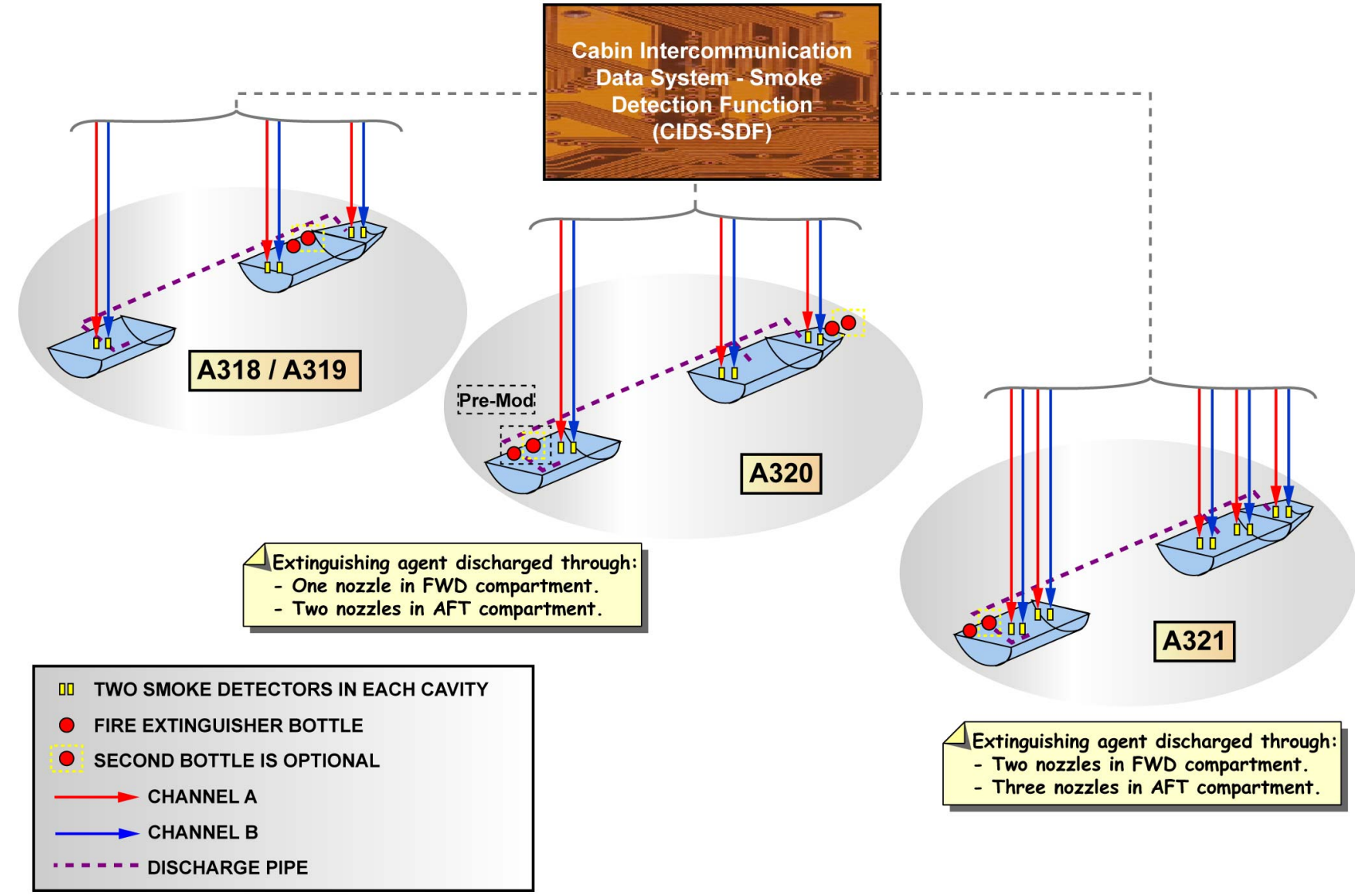
SYSTEM OVERVIEW (continued)

CARGO SMOKE DETECTION

The cargo compartment smoke detection system is monitored by the Smoke Detection Function (SDF) integrated in the Cabin Intercommunication Data System (CIDS). The CIDS-SDF receives signals from the cargo detectors and sends SMOKE or FAULT warnings to the Flight Warning Computer (FWC) to give an alert to the flight crew.

CARGO FIRE EXTINGUISHING

The cargo compartment fire-extinguishing agent is discharged into the FWD compartment through one nozzle (2 nozzles for A321) or into the AFT compartment through two nozzles (3 nozzles for A321). The standard system includes one extinguishing bottle in the FWD cargo compartment (or in the AFT bulk cargo compartment, RH side, for A318 and A319). For the A320, the extinguishing bottle can also be in the AFT cargo compartment.
An optional system includes two bottles. The second bottle can be used for large range operations.



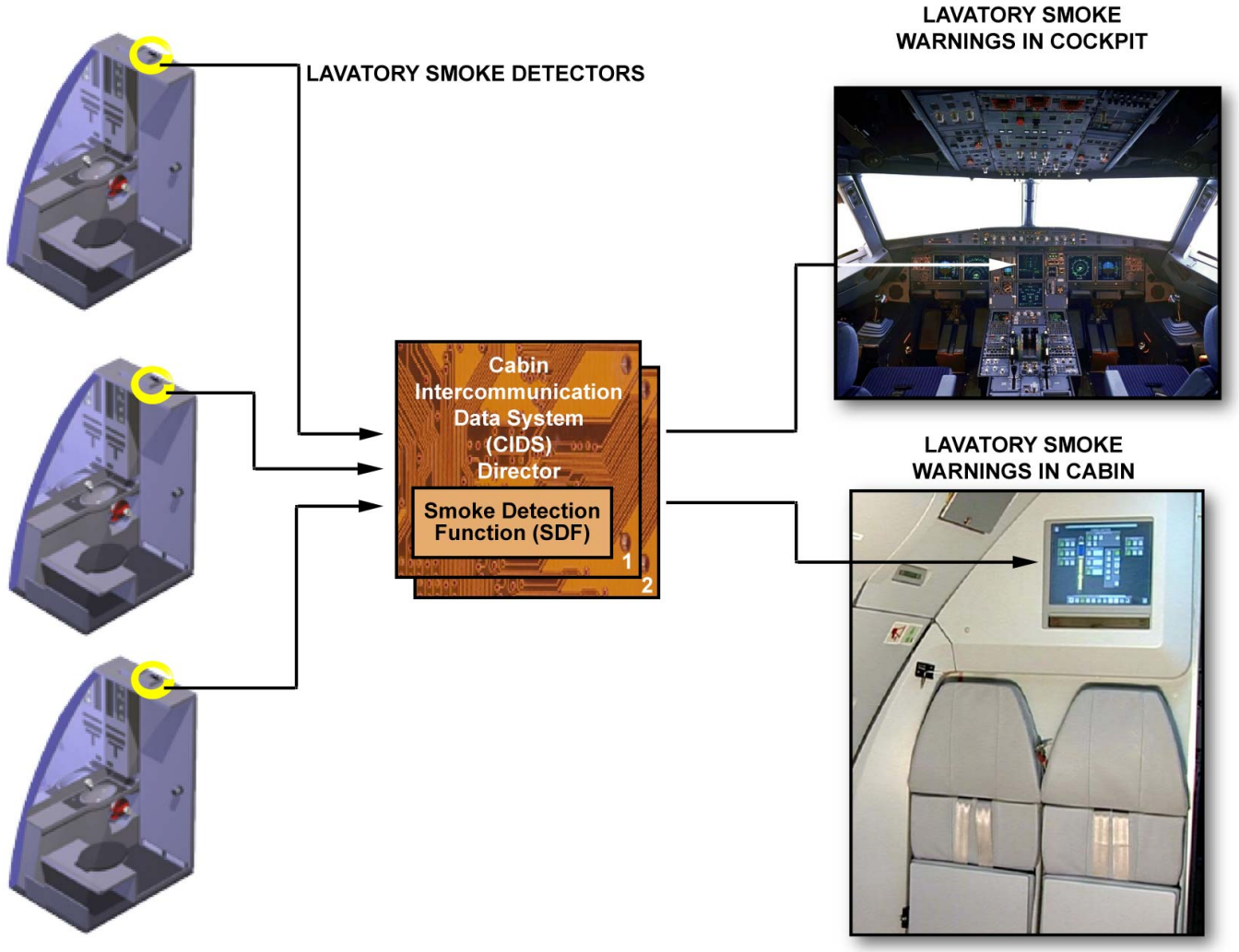
SYSTEM OVERVIEW - CARGO SMOKE DETECTION & CARGO FIRE EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

LAVATORY SMOKE DETECTION AND EXTINGUISHING

The lavatory smoke detection system is monitored by the SDF integrated in the CIDS. The CIDS-SDF receives signals from the lavatory detectors and sends SMOKE or FAULT warnings to the FWC to give an alert to the flight crew.
The protection of each lavatory waste bin is done by an automatic fire extinguishing system. A small pressurized extinguisher will automatically discharge if there is a fire. The fusible material in the discharge tube melts at high temperature and the pressurized agent is discharged into the waste bin.
LAV SMOKE warnings are also sent to the CIDS to give an alert to the cabin crew.



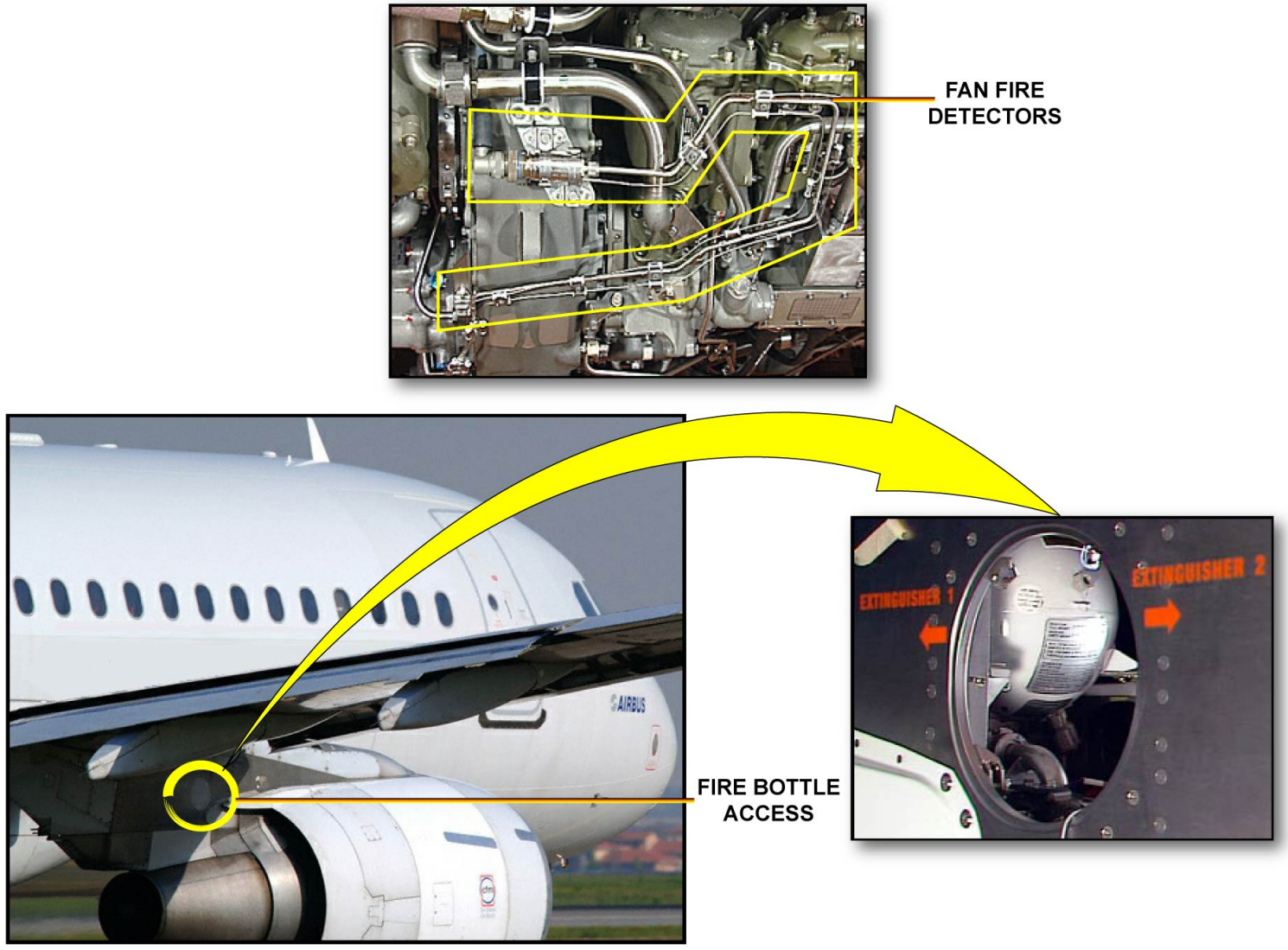
SYSTEM OVERVIEW - LAVATORY SMOKE DETECTION AND EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION

ENGINE FIRE DETECTION AND EXTINGUISHING

Each fire detection loop contains 3 detector elements connected in parallel.
The engine fire extinguishing bottles are in the pylon. There are access panels on the two sides of the pylon.



COMPONENT LOCATION - ENGINE FIRE DETECTION AND EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION (continued)

APU FIRE DETECTION AND EXTINGUISHING

Each APU fire detection loop is a single detector element installed around the interior of the APU compartment.
The APU fire extinguishing bottle is in the aft fuselage forward of the APU firewall. There is an access panel on the lower fuselage.

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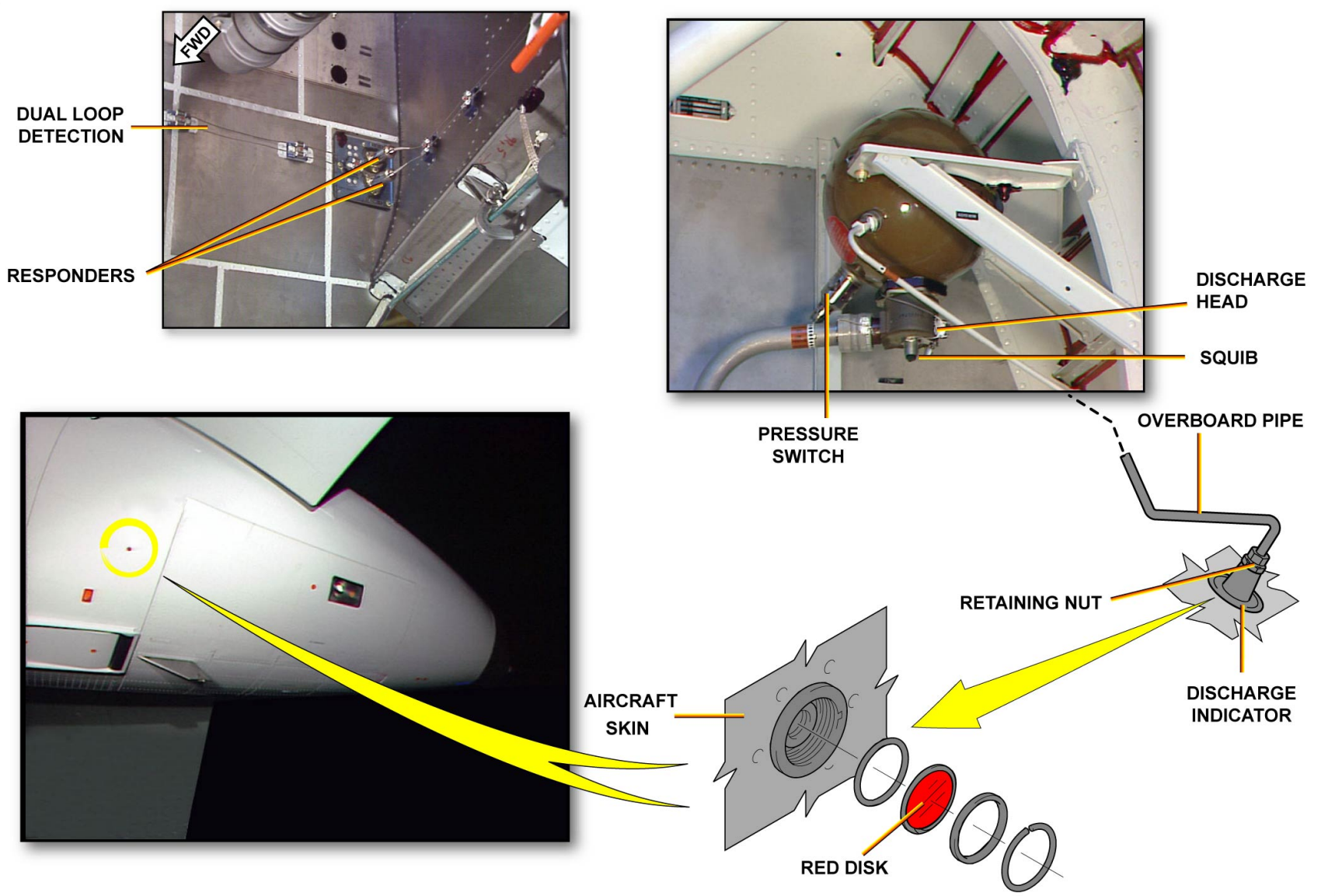

COMPONENT LOCATION - APU FIRE DETECTION AND EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION (continued)

AVIONICS SMOKE DETECTION

There is only one avionics smoke detector, which is in the avionics compartment in the ventilation extraction duct.

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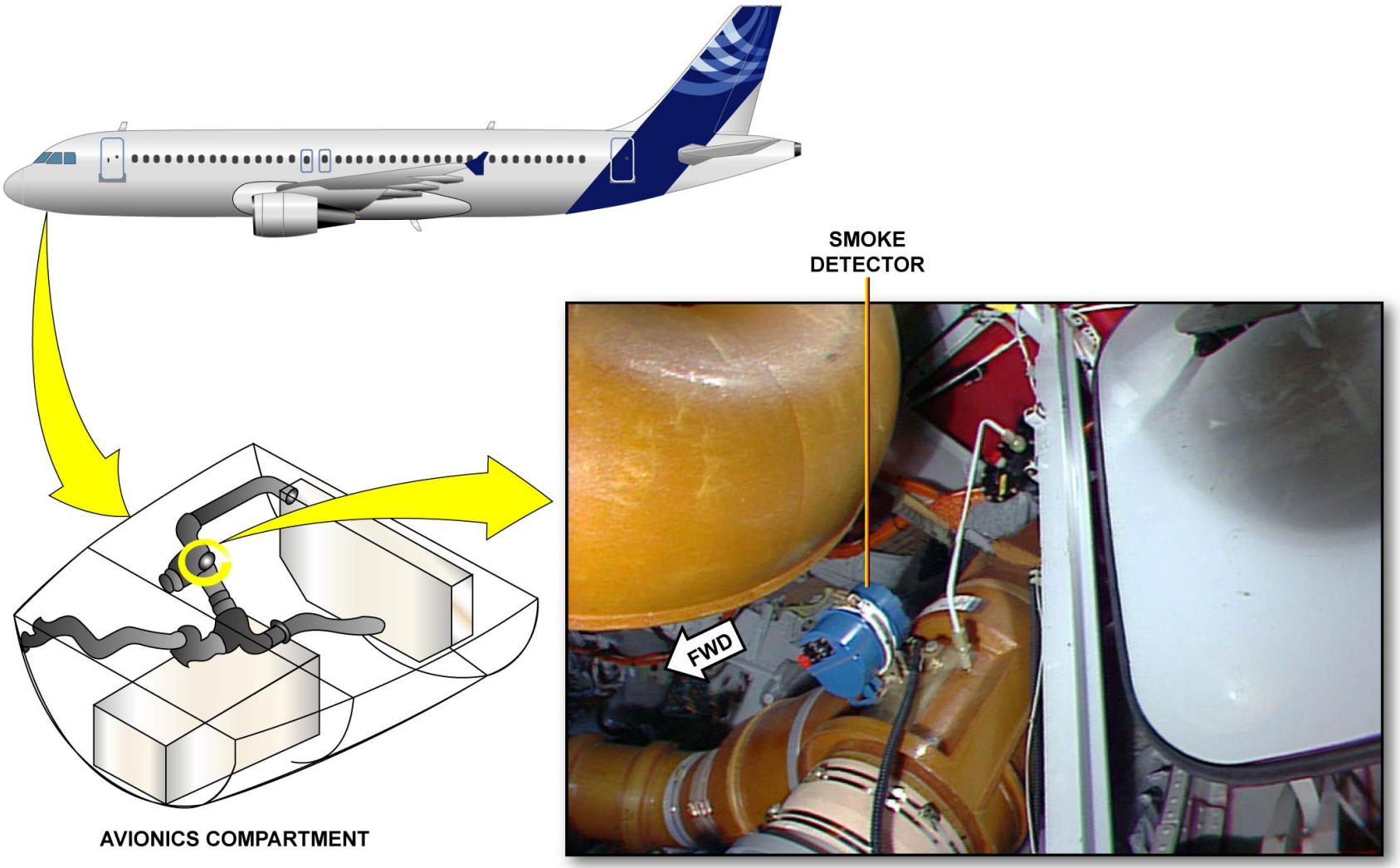

COMPONENT LOCATION - AVIONICS SMOKE DETECTION

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION (continued)

CARGO COMPARTMENT FIRE DETECTION AND EXTINGUISHING

Each cargo compartment has 2 smoke detectors in each cavity. The smoke detectors are installed in recessed panels in the compartment ceiling.

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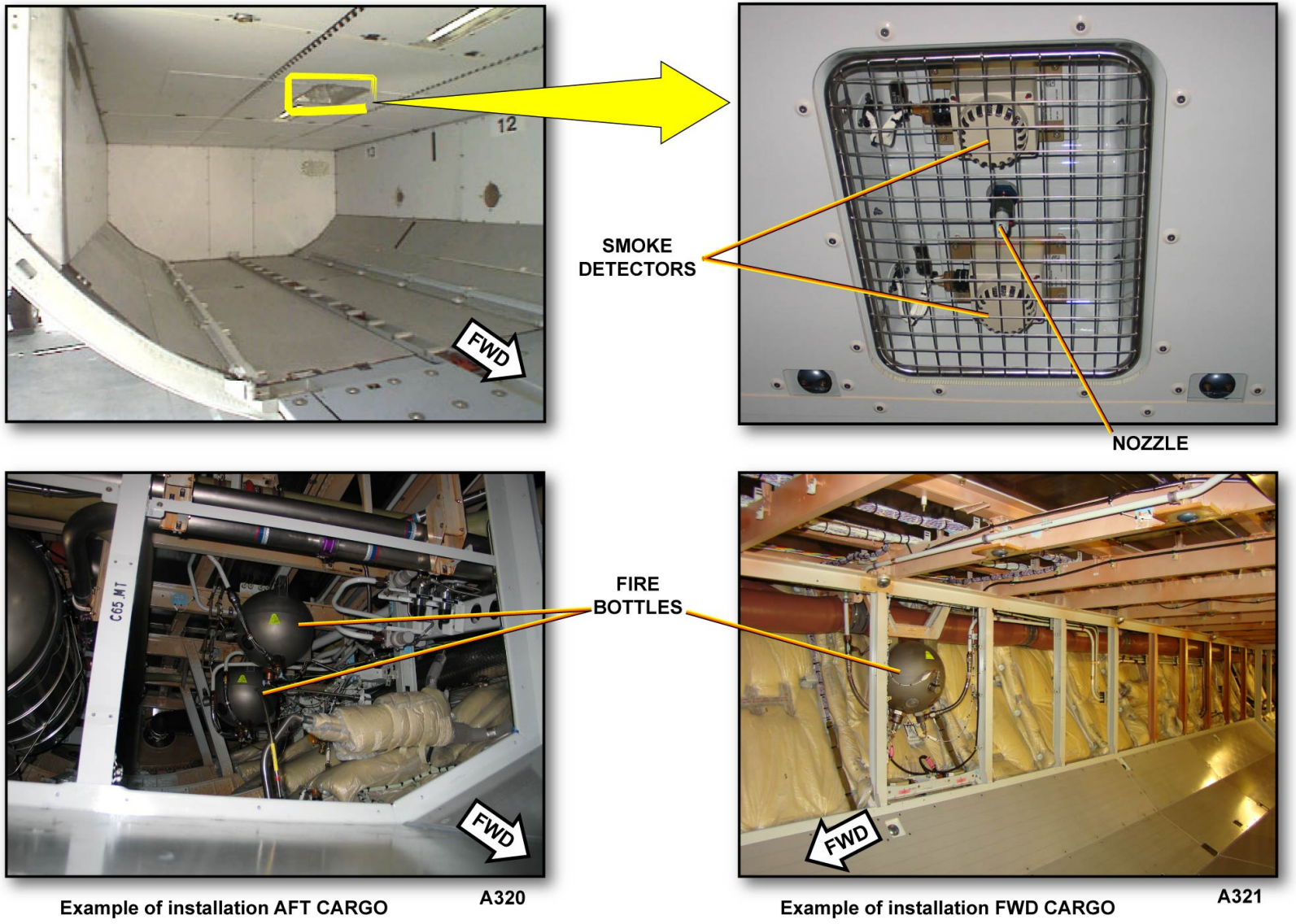


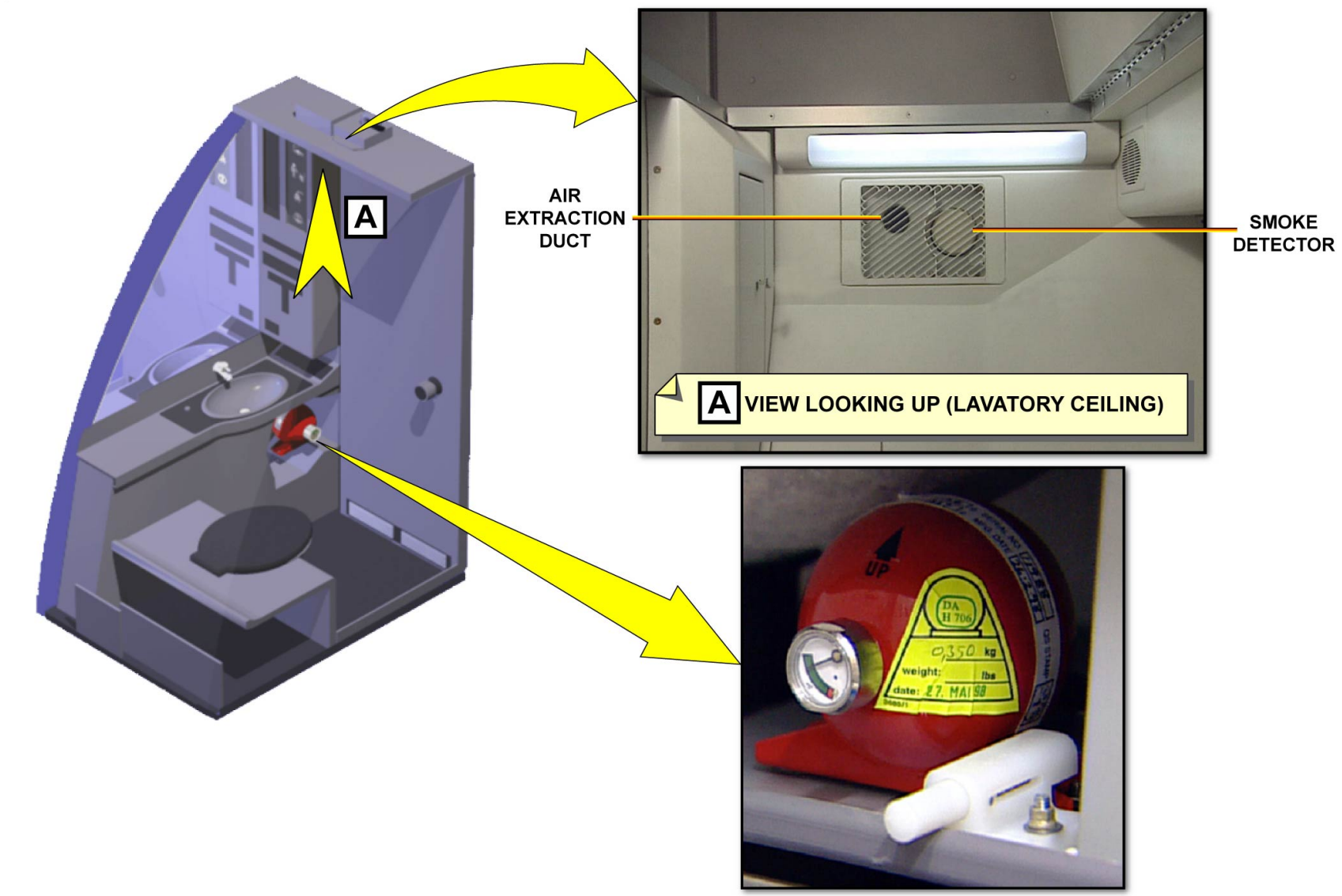
COMPONENT LOCATION - CARGO COMPARTMENT FIRE DETECTION AND EXTINGUISHING

FIRE PROTECTION SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION (continued)

LAVATORY SMOKE DETECTION AND EXTINGUISHING

Each lavatory has only one smoke detector, installed in the air extraction duct in the lavatory ceiling.
The protection of each lavatory waste bin is done by an automatic fire extinguishing system. A small pressurized extinguisher will automatically discharge into the waste bin if there is a fire.



COMPONENT LOCATION - LAVATORY SMOKE DETECTION AND EXTINGUISHING

FIRE PROTECTION SYSTEM CONTROL & INDICATING (2)

LOCATE CONTROL/INDICATING IN COCKPIT

ENGINE FIRE PROTECTION

APU FIRE PROTECTION + GND AUTO EXTINGUISHING

CARGO SMOKE PROTECTION

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UGB13131 - U7ST0M0 - UM26IZLEVEL0202

ENGINE FIRE DETECTION LOGIC (3)

FIRE DETECTORS STATE

In NORMAL STATE, the INTEGRITY switch is closed and the ALARM switch is open.
In ALARM STATE:
The effect of an average temperature expands the helium (inert) gas, which in turn closes the ALARM switch, or the effect of heat caused by a flame or hot gas, releases core (active) gas from the hybrid core, which in turn closes the ALARM switch.
In both cases, the detector sends a fire signal.
In FAULT STATE:
In the event of gas pressure loss (pipe fracture or cut off due to a torching flame), the INTEGRITY switch opens and generates a fault signal.

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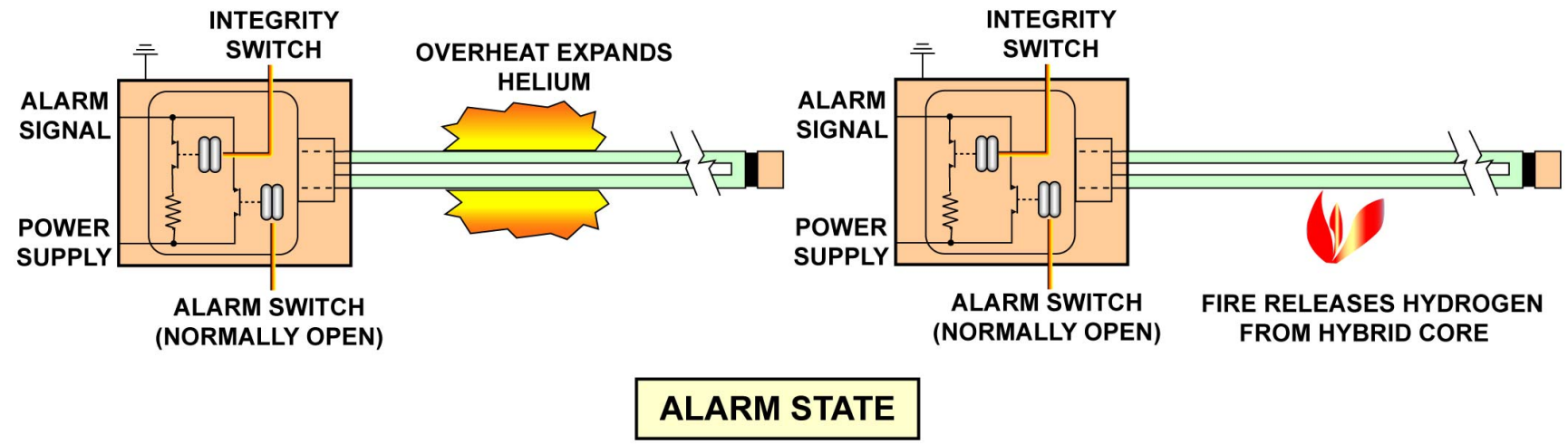

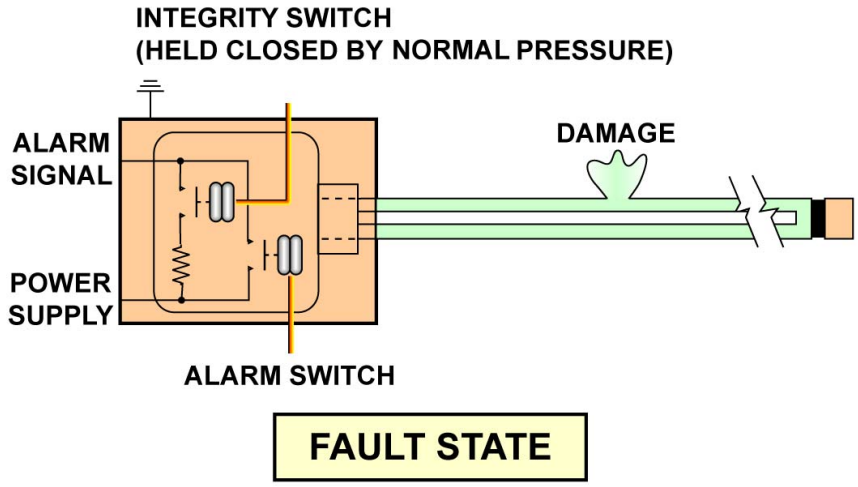

FIRE DETECTORS STATE

ENGINE FIRE DETECTION LOGIC (3)

GENERAL

The engine Fire Detection Unit (FDU) has two channels capable of detecting any case of engine fire and loop failure. Each channel does the same detection logic depending on the loop A and loop B status.

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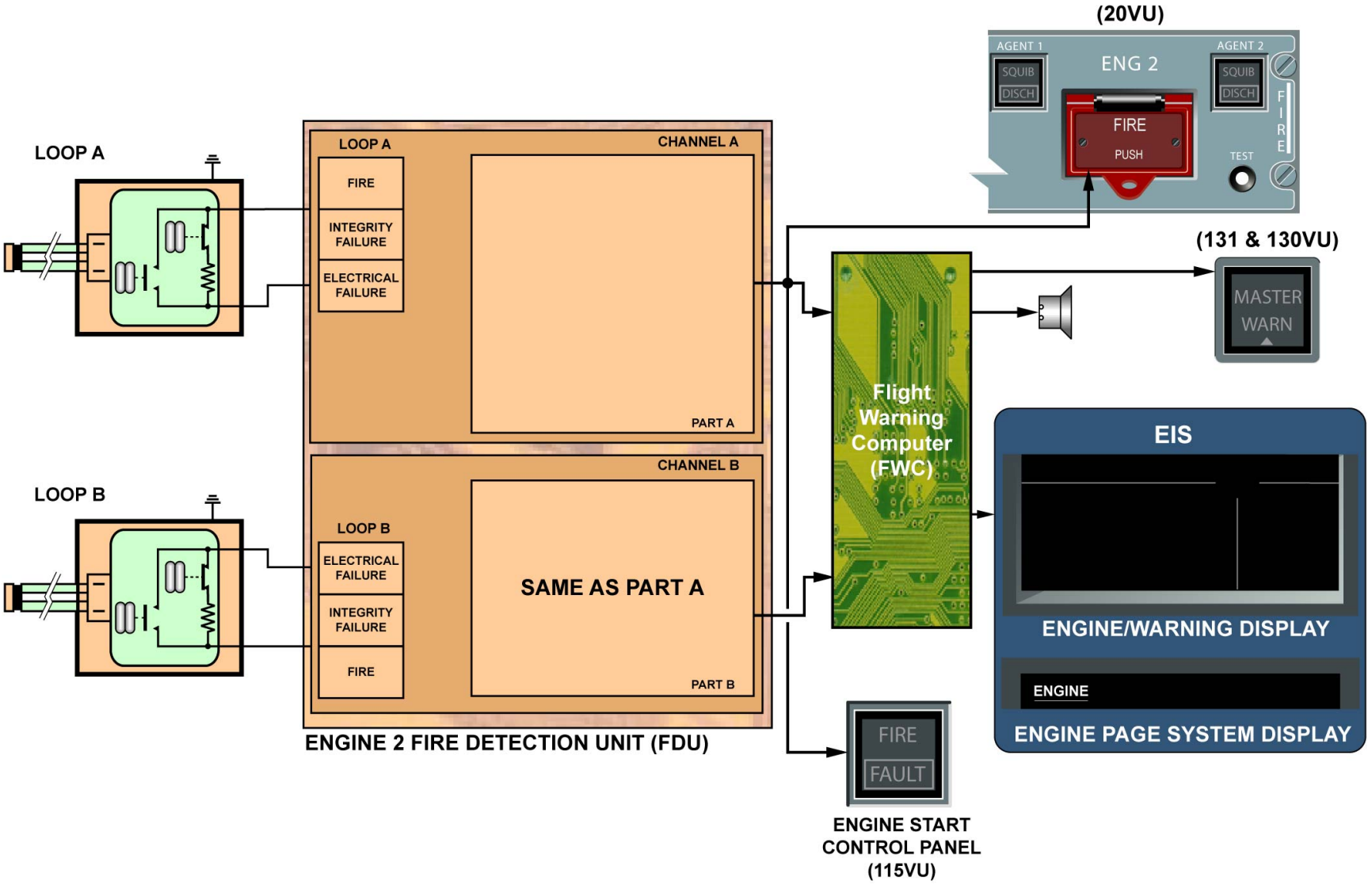
(20VU)
AGENT 1
SQUIB
DISCH
ENG 2
AGENT 2
SQUIB
DISCH
FIRE
PUSH
TEST
F
I
R
E
(131 & 130VU)
MASTER
WARN
LOOP A
LOOP A
CHANNEL A
FIRE
INTEGRITY
FAILURE
ELECTRICAL
FAILURE
PART A
LOOP B
CHANNEL B
LOOP B
ELECTRICAL
FAILURE
INTEGRITY
FAILURE
FIRE
SAME AS PART A
PART B
ENGINE 2 FIRE DETECTION UNIT (FDU)
Flight
Warning
Computer
(FWC)
EIS
ENGINE/WARNING DISPLAY
ENGINE
ENGINE PAGE SYSTEM DISPLAY
FIRE
FAULT
ENGINE START
CONTROL PANEL
(115VU)

GENERAL

ENGINE FIRE DETECTION LOGIC (3)

FIRE WARNING

In case of a fire detected on both loops or on one loop with the other faulty, the channels provide a fire warning to the ENGINE FIRE panel, ENGINE START control panel, MASTER WARN and ECAM displays. The FDU generates a fire warning signal if any of the following conditions are met:

- fire on loop A and fire on loop B,
- fire on loop A and fault on loop B,
- fault on loop A and fire on loop B,
- fault on loop A and fault on loop B within 5 seconds (both loops broken due to a torching flame).

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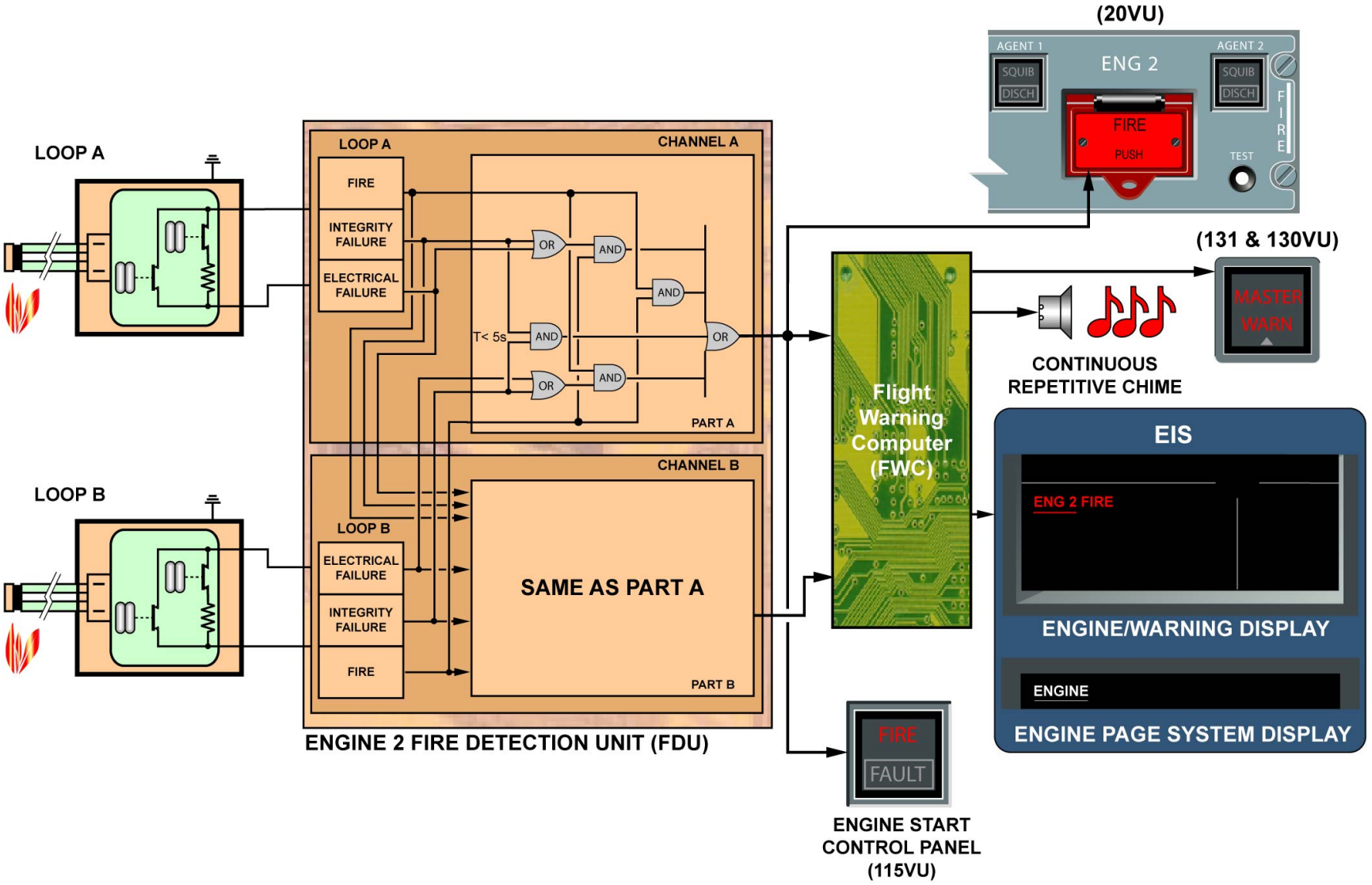

FIRE WARNING

ENGINE FIRE DETECTION LOGIC (3)

LOOP FAULT WARNING

In case of a loop failure the FDU supplies a loop fault warning signal to the ECAM and Centralized Fault Display Interface Unit (CFDIU).
The FDU generates an inoperative signal if any of the following conditions are met:
- electrical failure,
- integrity failure,
- detection of a single loop FIRE during more than 16 s while the other loop is in normal condition.

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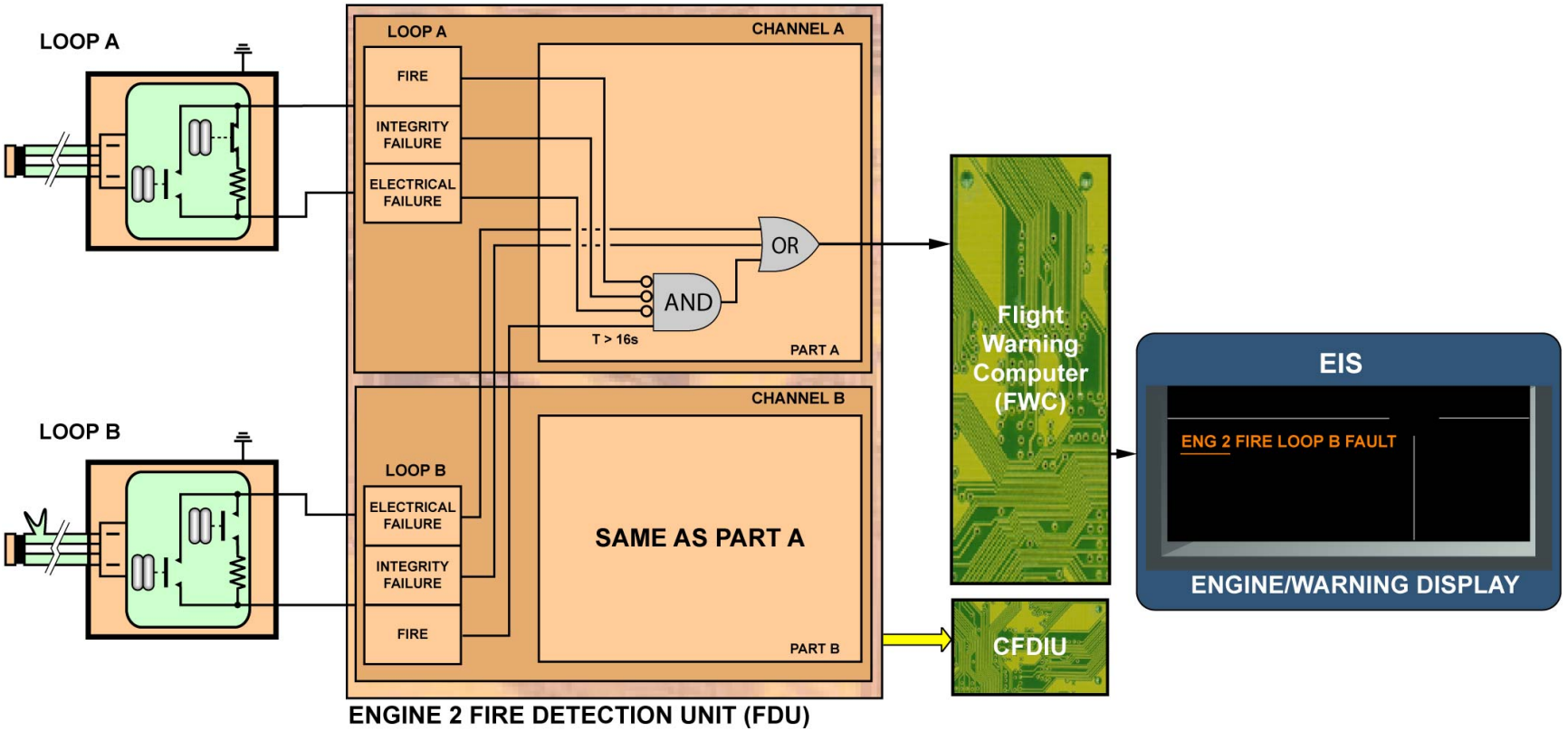

LOOP FAULT WARNING

ENGINE FIRE DETECTION LOGIC (3)

DETECTION FAULT WARNING

The detection fault logic is based on a dual loop failure. It agrees with a total loss of the detection system. When the FDU generates two inoperative signals related to loop A and loop B fault logic, the Flight Warning Computer (FWC) elaborates the fault warning.

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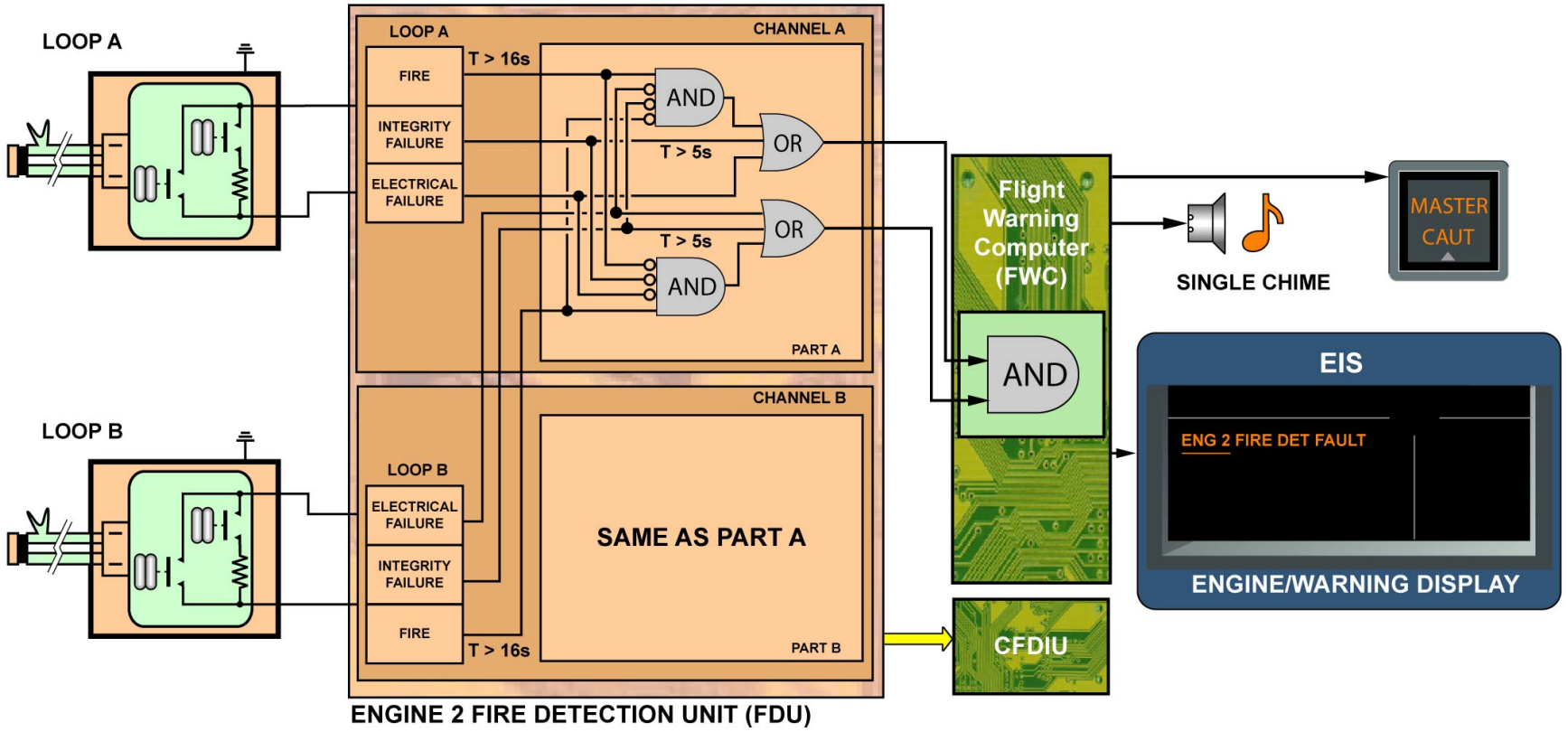

DETECTION FAULT WARNING

ENGINE FIRE PUSHBUTTON INTERFACES (3)

GENERAL

During the engine fire procedure, the ENGINE FIRE P/BSW is manually released out. This triggers several automatic sequences simplifying further crew actions and system monitoring.

MONITORING INTERFACES

Releasing the fire P/BSW out cancels the Continuous Repetitive Chime (CRC), signals the action to the Flight Warning Computer (FWC) for further management of other warnings and messages and the SQUIB light comes on, on the engine fire control panel.

SUPPLY INTERFACES

Quick isolation of all systems on the related engine, which could be the origin of the fire or feed the fire, is achieved as soon as the fire P/BSW is released out. These systems are:
- fuel,
- air,
- electric power,
- hydraulic power.

The electric supply to the Engine Interface Unit (EIU) is also disconnected.

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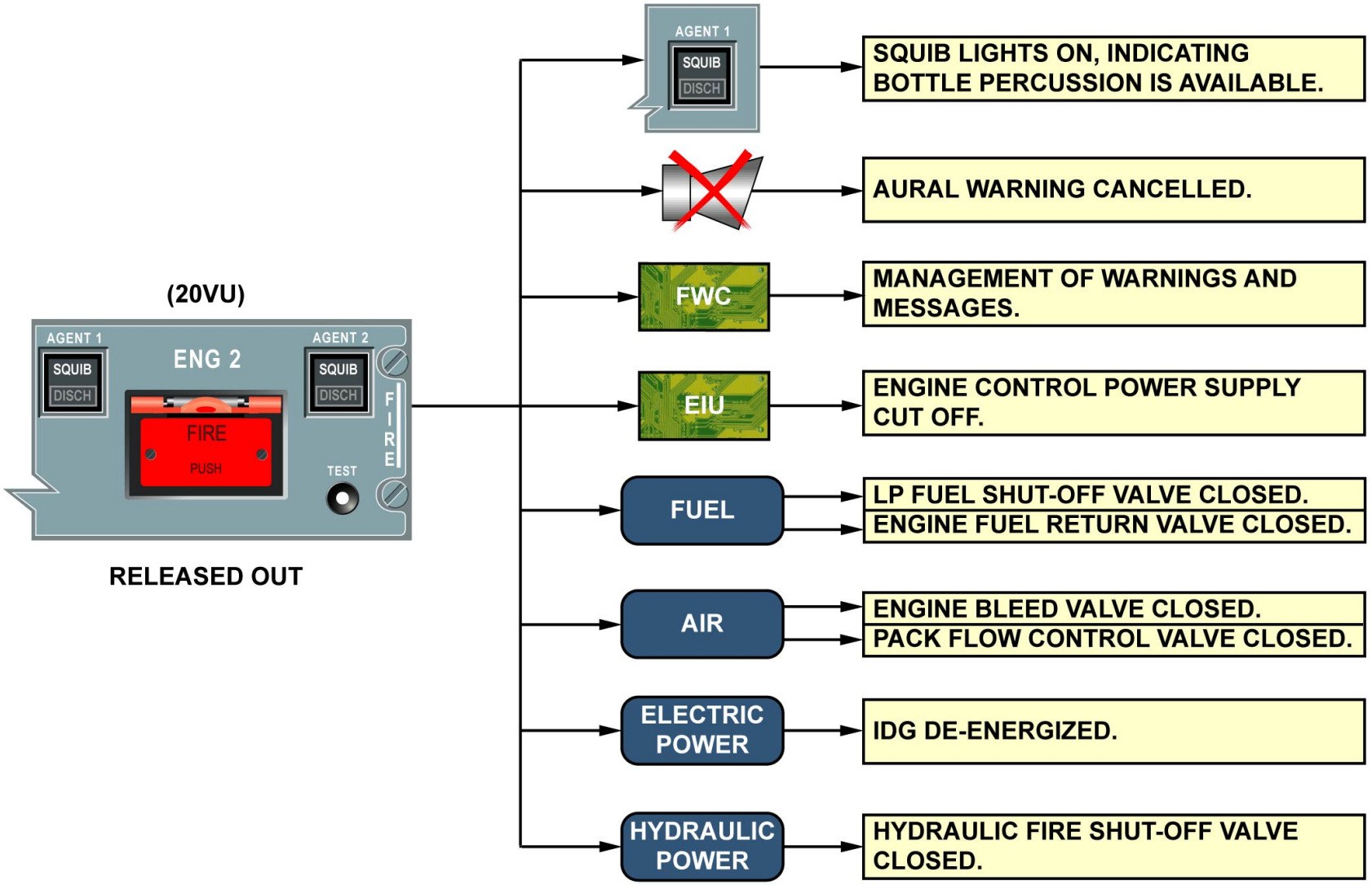

GENERAL ... SUPPLY INTERFACES

SYS OPERATION IN CASE OF ENG FIRE IN FLIGHT (3)

GENERAL

The following fire procedure describes the flight crew procedure when an engine FIRE warning occurs in flight. The procedure takes engine 2 as an example.

FIRE PROCEDURE

FIRE DETECTION

When a fire is detected, the Continuous Repetitive Chime (CRC) sounds, the MASTER Warning flashes, the ENGINE FIRE P/BSW light comes on and the FIRE light on the Engine panel comes on. The warning is shown on the Engine and Warning Display and the engine system page comes up automatically.

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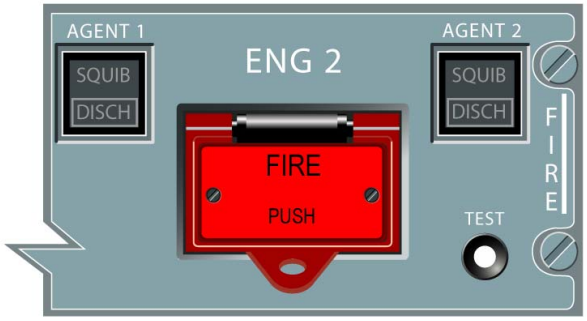
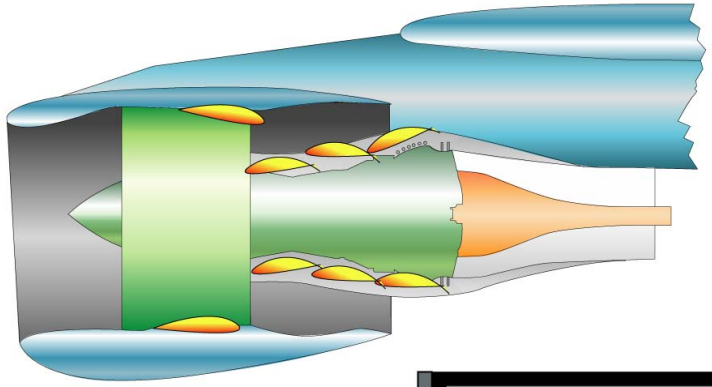
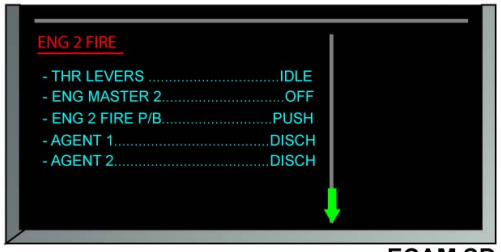


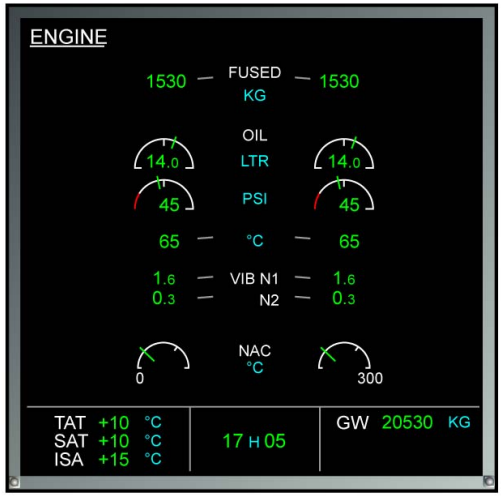
(20VU)

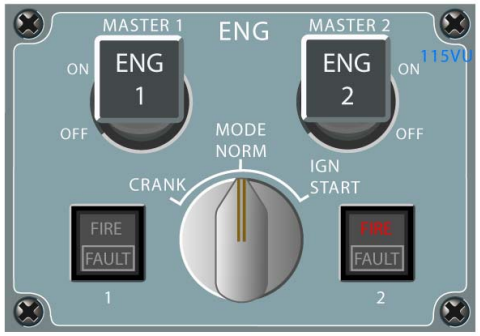


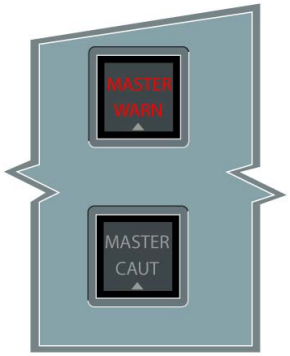
ECAM EWD



ECAM SD







(131VU)

GENERAL & FIRE PROCEDURE

SYS OPERATION IN CASE OF ENG FIRE IN FLIGHT (3)

FIRE PROCEDURE (continued)

ISOLATION

To follow the fire procedure the following actions have to be done:

NOTE: Note: The Master Warning P/BSW may be pressed to cancel the continuous repetitive chime.

- set thrust lever to "IDLE".
- set ENG MASTER 2 lever to "OFF". When the MASTER lever is set to OFF, the low pressure and the high pressure fuel valves close and cause engine shutdown.
- release ENG 2 FIRE P/BSW.

When the ENGINE FIRE P/BSW is released out the Single Chime (SC) sounds. The MASTER CAUTion comes on due to systems deactivation. The fuel low pressure valve closure is confirmed .The SQUIB lights illuminate on the AGENT P/BSWs to indicate that AGENT P/BSWs can be used.

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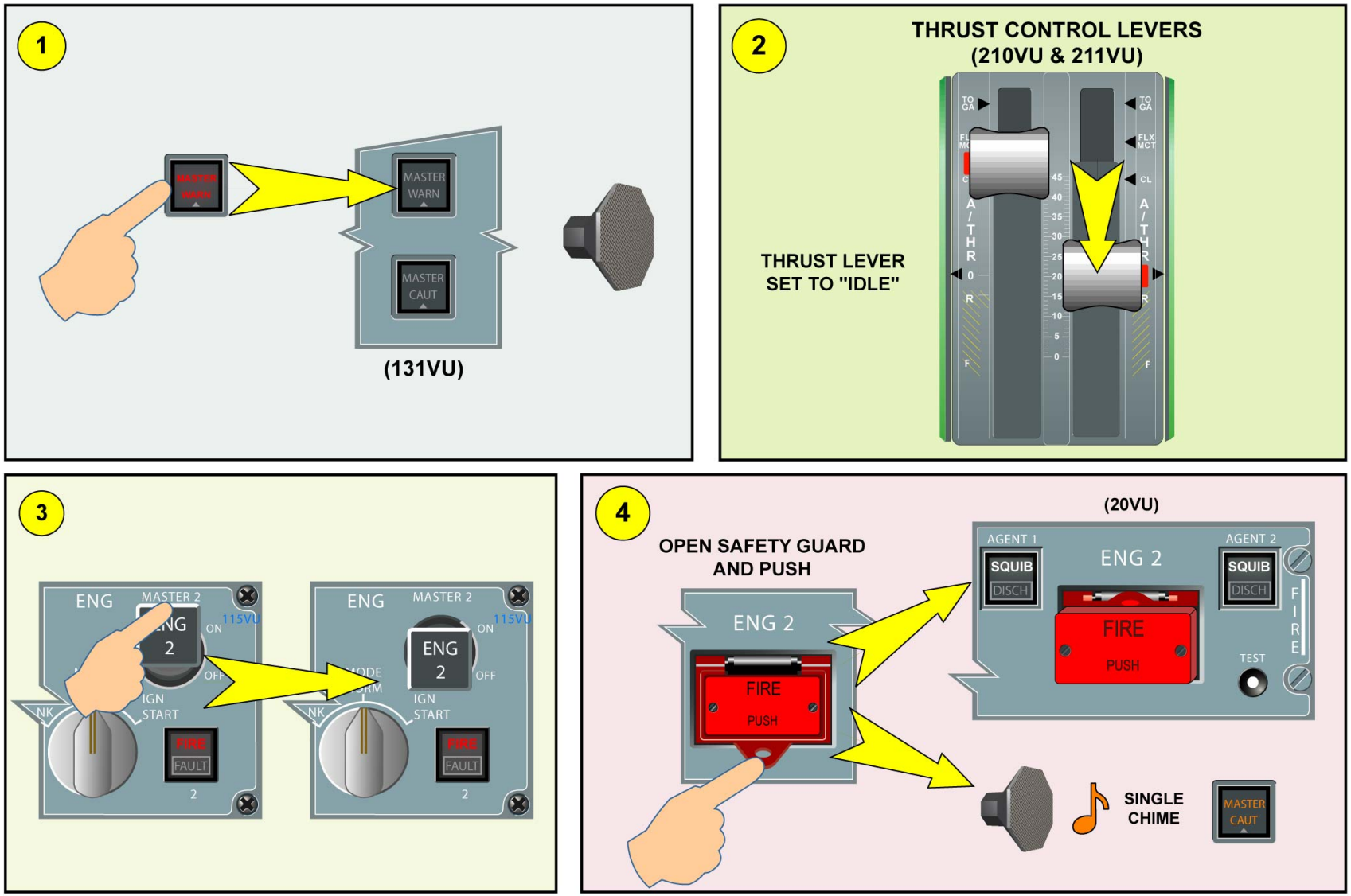

FIRE PROCEDURE - ISOLATION

SYS OPERATION IN CASE OF ENG FIRE IN FLIGHT (3)

FIRE PROCEDURE (continued)

FIRE EXTINGUISHING

To extinguish the fire the following actions have to be done:
- wait for 10 seconds: this is required to reduce engine windmilling, reducing the nacelle ventilation which increases the agent effect,
- press AGENT 1 P/BSW. When the AGENT 1 P/BSW is pressed, the fire bottle one is discharged in the engine compartment and the DISCHarge light comes on. If the fire still persists after 30 seconds, the second bottle must be discharged,
- press AGENT 2 P/BSW. When the fire is extinguished, the ENGINE FIRE P/BSW light and the FIRE indication on the ENG panel go off.

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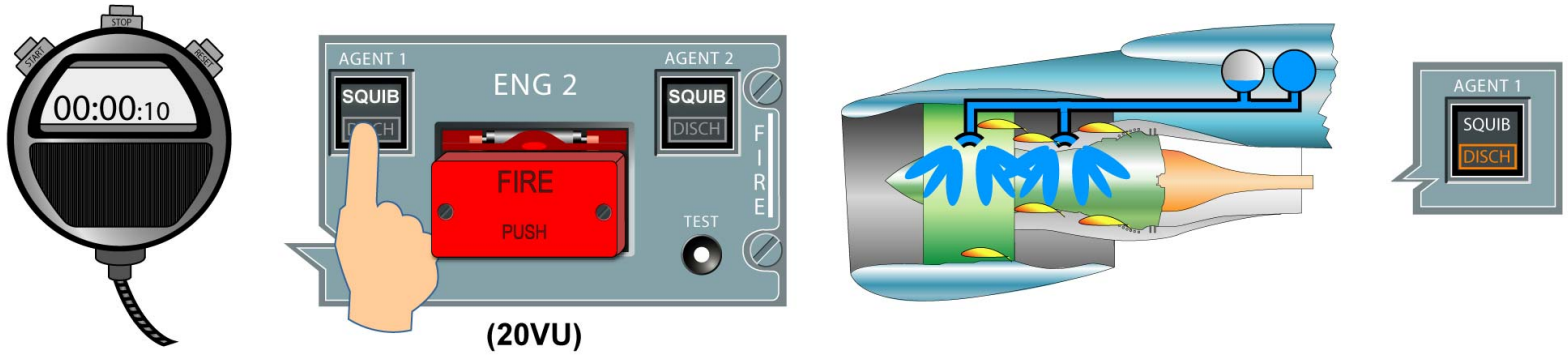
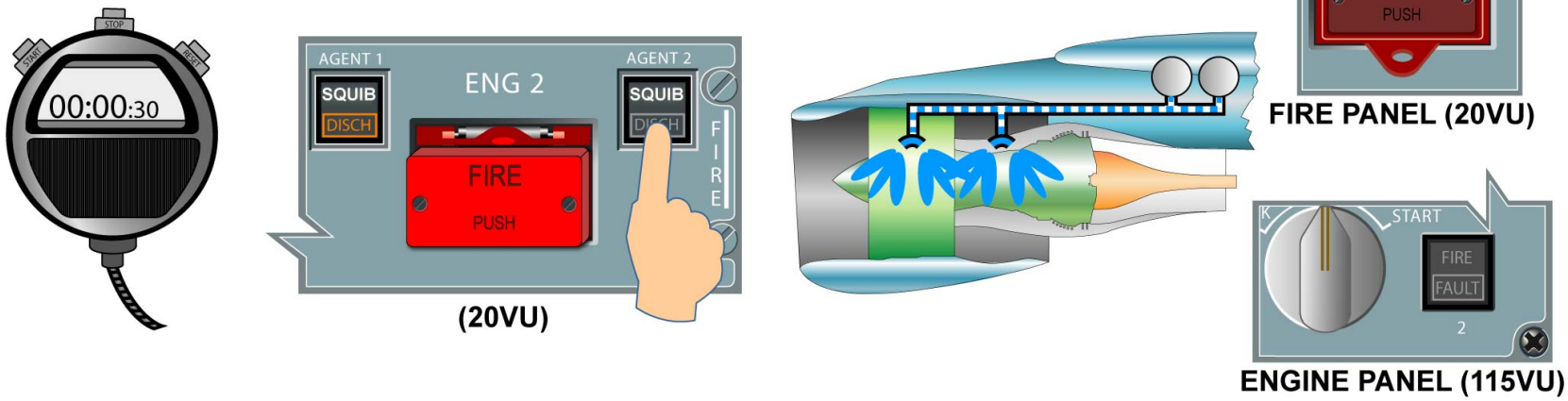
1



(20VU)

IF THE FIRE STILL PERSISTS AFTER 30 SECONDS

2



(20VU)

FIRE PANEL (20VU)

ENGINE PANEL (115VU)

FIRE PROCEDURE - FIRE EXTINGUISHING

SYS OPERATION IN CASE OF ENG FIRE ON GND (3)

GENERAL

The following FIRE procedure describes the procedure when an engine FIRE warning occurs on the ground. The procedure takes Engine 2 as an example.

FIRE PROCEDURE

FIRE DETECTION

When fire is detected, the Continuous Repetitive Chime (CRC) sounds, the MASTER WARNing flashes, the ENGINE FIRE P/BSW light comes on and the FIRE light on the ENGine panel comes on. The warning is shown on the Engine and Warning Display and the engine system page comes up automatically.

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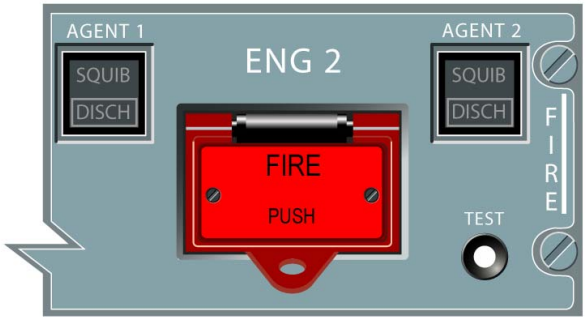
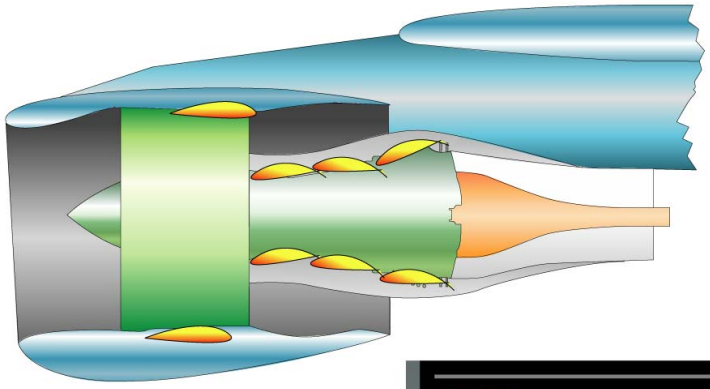
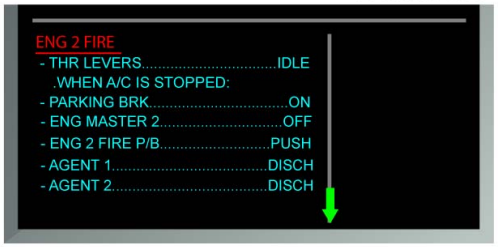
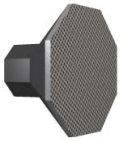


(20VU)

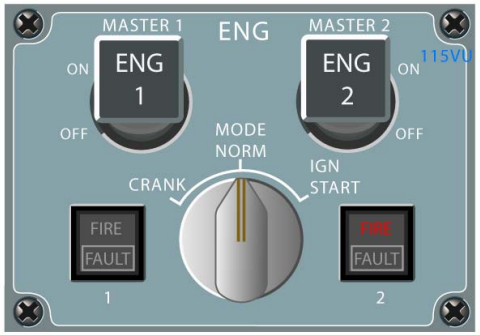


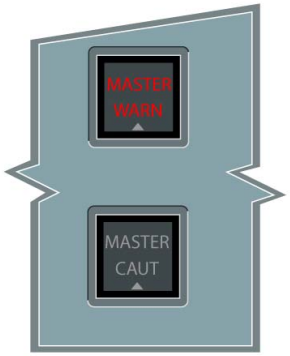
ECAM EWD





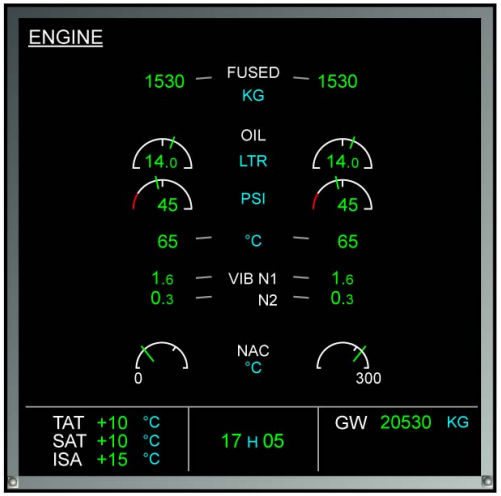
CONTINUOUS
REPETITIVE CHIME





(131VU)

ECAM SD



GENERAL & FIRE PROCEDURE

SYS OPERATION IN CASE OF ENG FIRE ON GND (3)

FIRE PROCEDURE (continued)

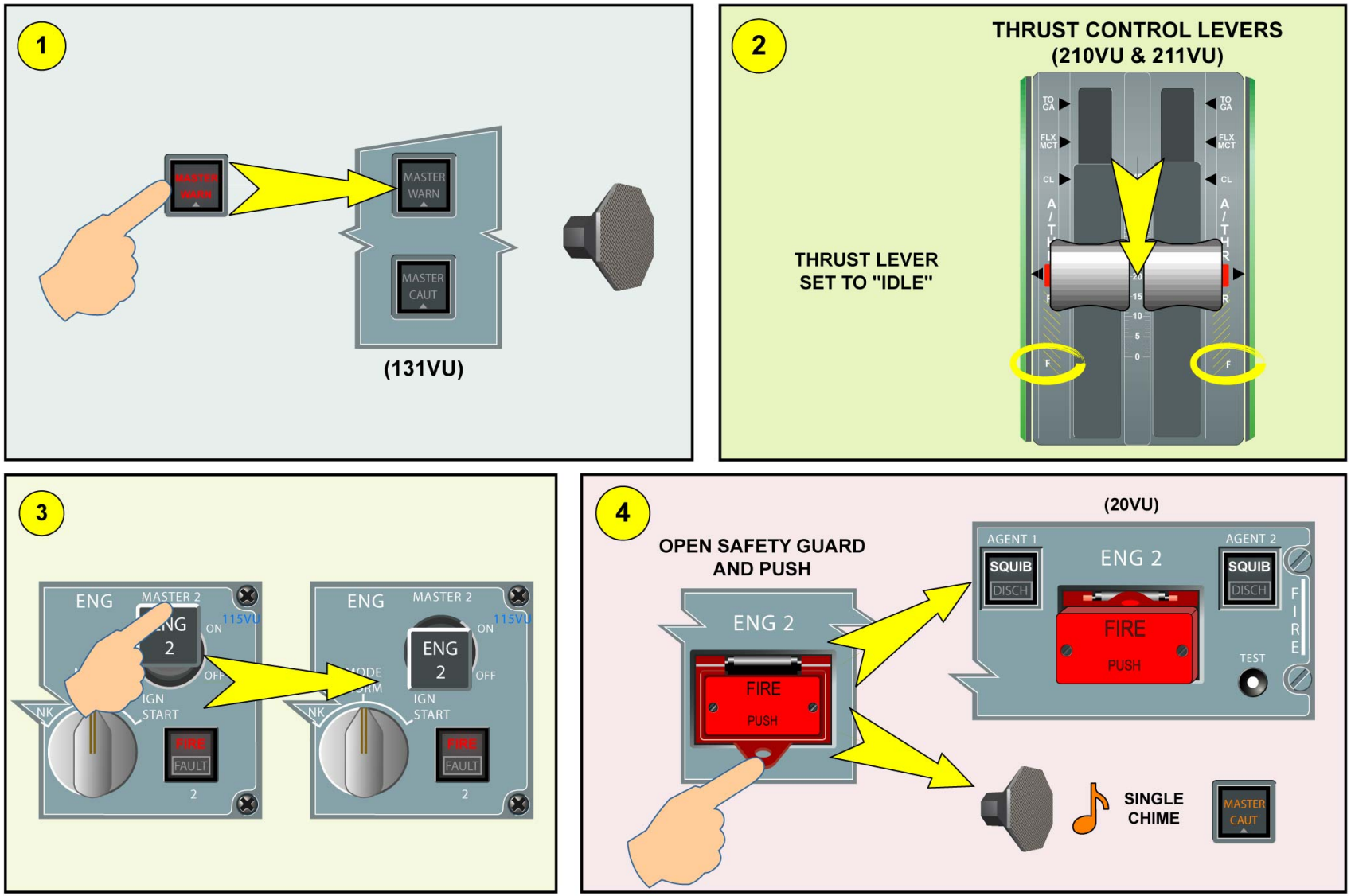
ISOLATION

To follow the fire procedure the following actions have to be done:

NOTE: Note: The MASTER WARN P/BSW may be pressed to cancel the CRC.

- as long as the rolling speed of the aircraft does not exceed V1, the crew must stop the aircraft,
- set thrust levers to "IDLE". Note that full REVerse may be used to stop the aircraft,
- when the aircraft is stopped and parking brake is set to "ON", set ENG MASTER 2 lever to "OFF". When the ENG MASTER lever is set to "OFF", the low pressure and high pressure valves close and cause engine shutdown,
- select ENG 2 FIRE P/BSW. When the ENGINE FIRE P/BSW is released out the Single Chime (SC) sounds. The MASTER CAUTion comes on due to systems deactivation. The fuel low pressure valve closure is confirmed. The SQUIB lights on the AGENT P/BSWs come on to indicate that AGENT P/BSWs can be used.

UGB13131 - U7ST0M0 - UM26D3000000001



FIRE PROCEDURE - ISOLATION

SYS OPERATION IN CASE OF ENG FIRE ON GND (3)

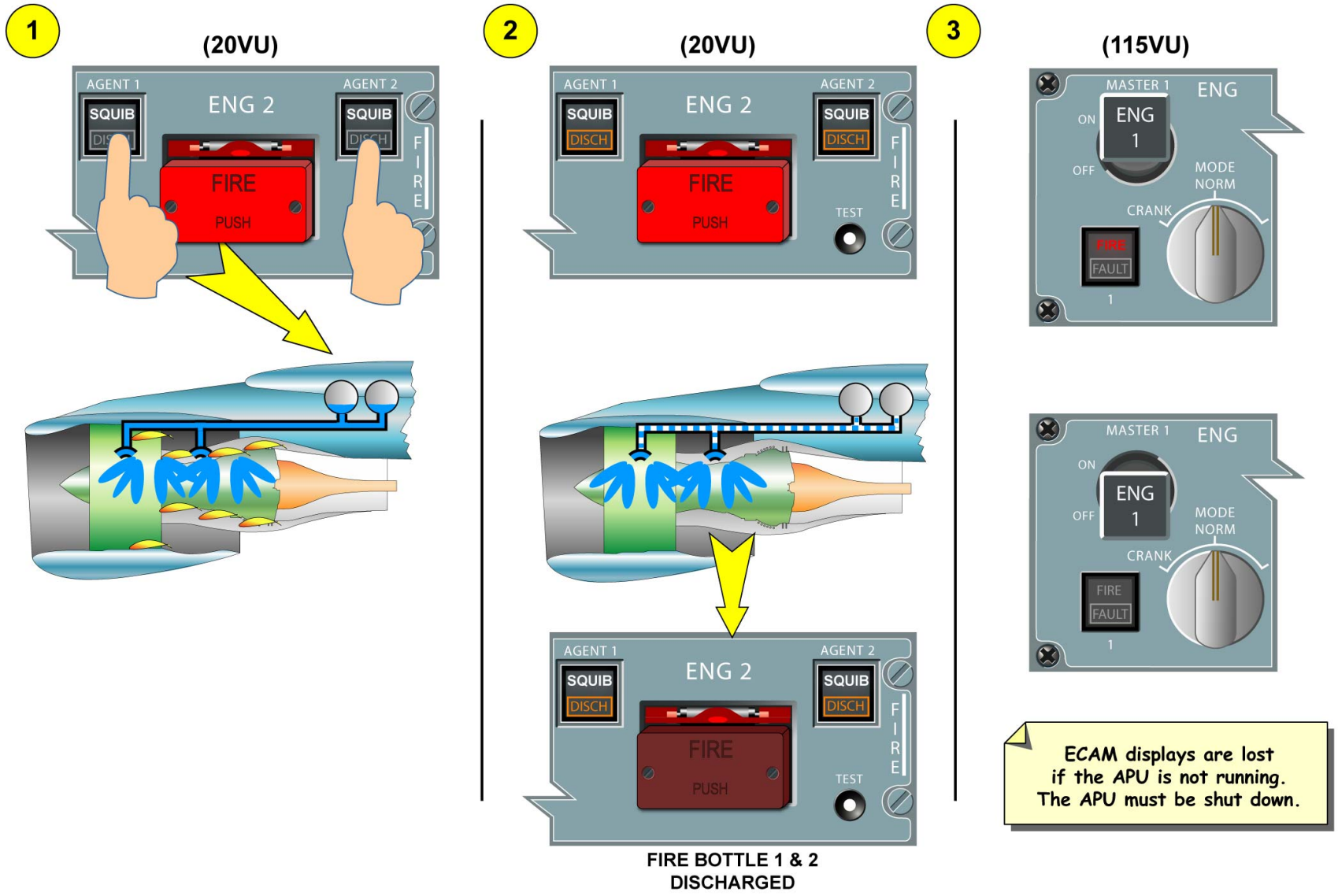
FIRE PROCEDURE (continued)

FIRE EXTINGUISHING

To follow the fire procedure, the following actions have to be done:
- select AGENT 1 and AGENT 2 P/BSWs. When the AGENT 1 and AGENT 2 P/BSWs are pressed, both engine fire bottles are discharged in the engine compartment and the DISCHarge lights come on,
- select ENG MASTER 1 lever to OFF.

When the second engine is shut down, if the APU is not running the ECAM displays are lost. If the APU is running, it must be shut down.

UGB13131 - U7ST0M0 - UM26D3000000001



FIRE PROCEDURE - FIRE EXTINGUISHING

PRECAUTIONS (3)

GENERAL

Specific precautions must be taken during removal or installation of a fire extinguishing bottle and a discharge cartridge.

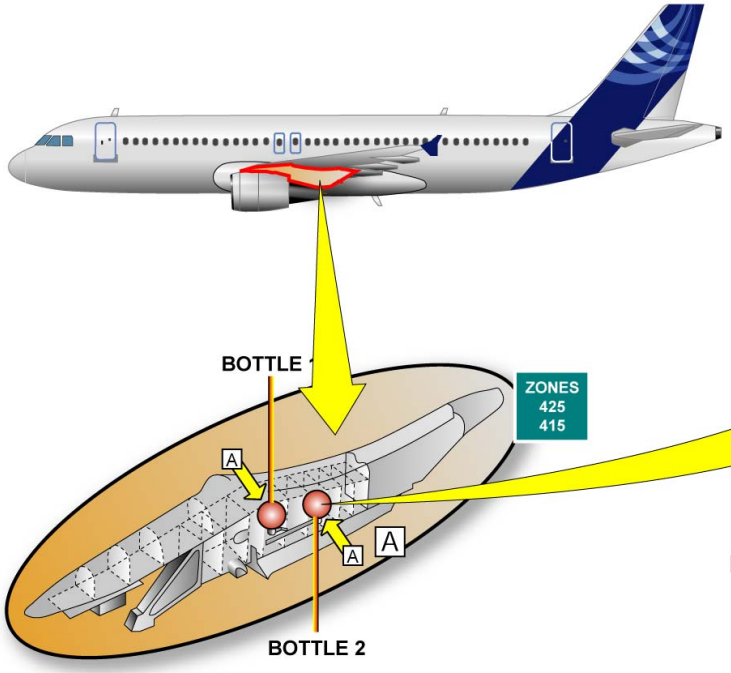
FIRE BOTTLE

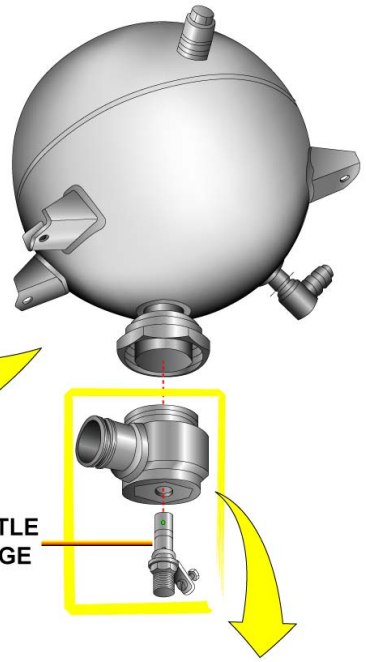
WARNING: The fire bottle cartridges are explosive. Remove them before working on the bottle. Protective caps must be installed during bottle removal/installation to prevent damage to discharge diaphragm, which could result in injury to personnel.

DISCHARGE CARTRIDGE

WARNING: Before power is supplied to the A/C make sure that electrical circuits upon which work is in progress are isolated. Cartridges are class "C" explosives and must be handled or stored by authorized personnel or disposed of by an approved method. When cartridge electrical connectors are disconnected, the cartridge electrical pins must be shunted with a protective shunt, which is given by the manufacturer. A shunt plug or shorting clip will prevent bottle discharge which could cause injury to maintenance personnel. The cartridge installed must be supplied by fire bottle vendor and agreed with the specification indicated in the AMM.

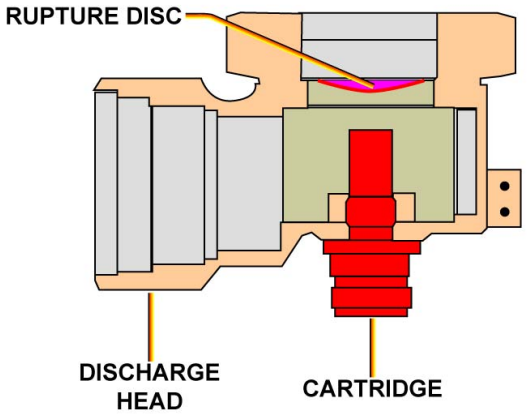
UGB13131 - U7ST0M0 - UM26O1000000001





AUTHORIZED PERSONNEL ONLY

PROTECTIVE CAP



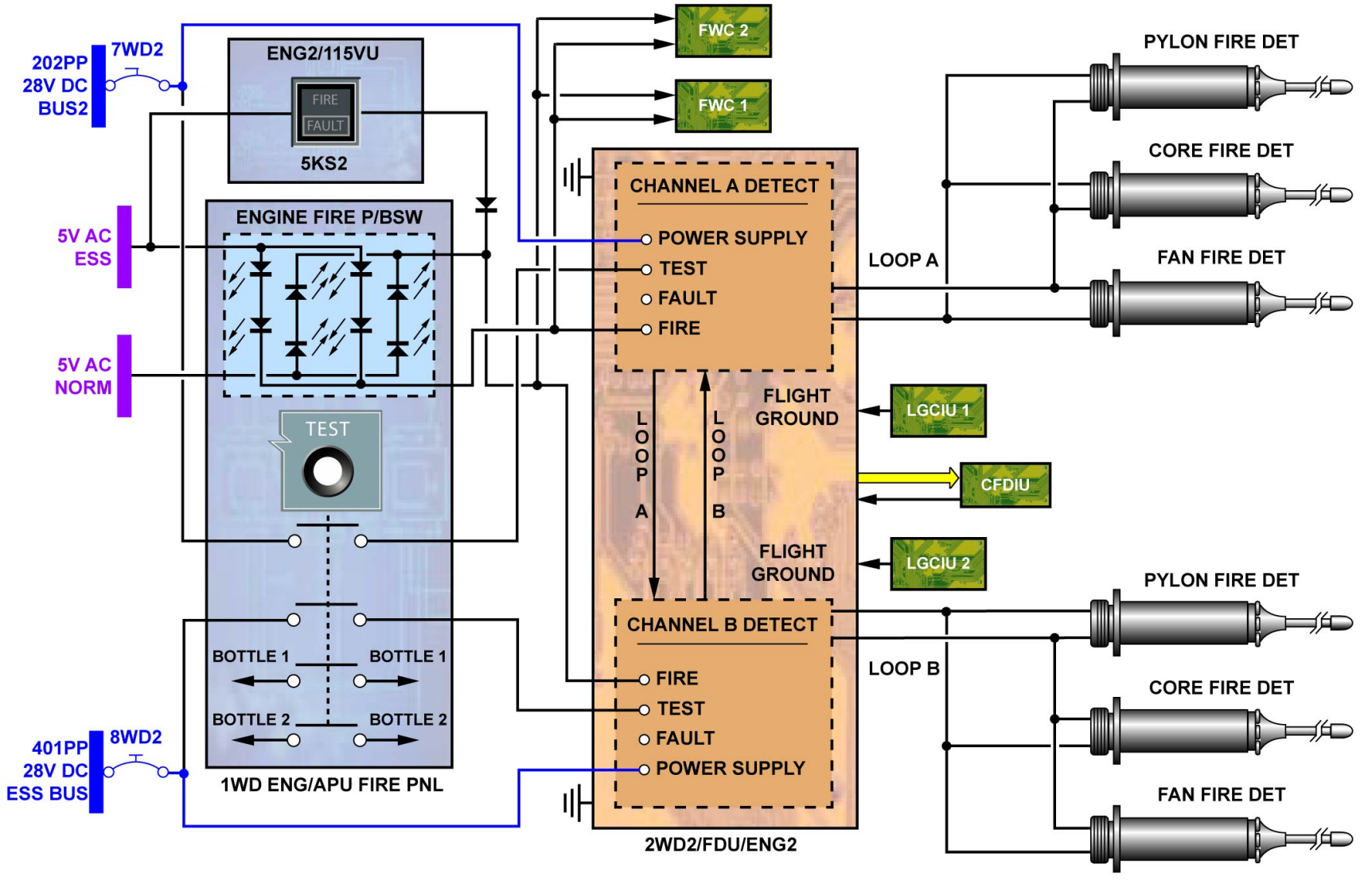
GENERAL ... DISCHARGE CARTRIDGE

ELECTRICAL CIRCUITS (3)

FIRE DETECTION CIRCUIT

The engine fire and overheat detection system is supplied by the electrical power from the DC system. Each engine has two continuous loops connected in parallel to a Fire Detection Unit (FDU). Each FDU has two identical channels: channel A and B. Each one has its own power supply and is connected to one fire detection loop.

UGB13131 - U7ST0M0 - UM26O4000000001



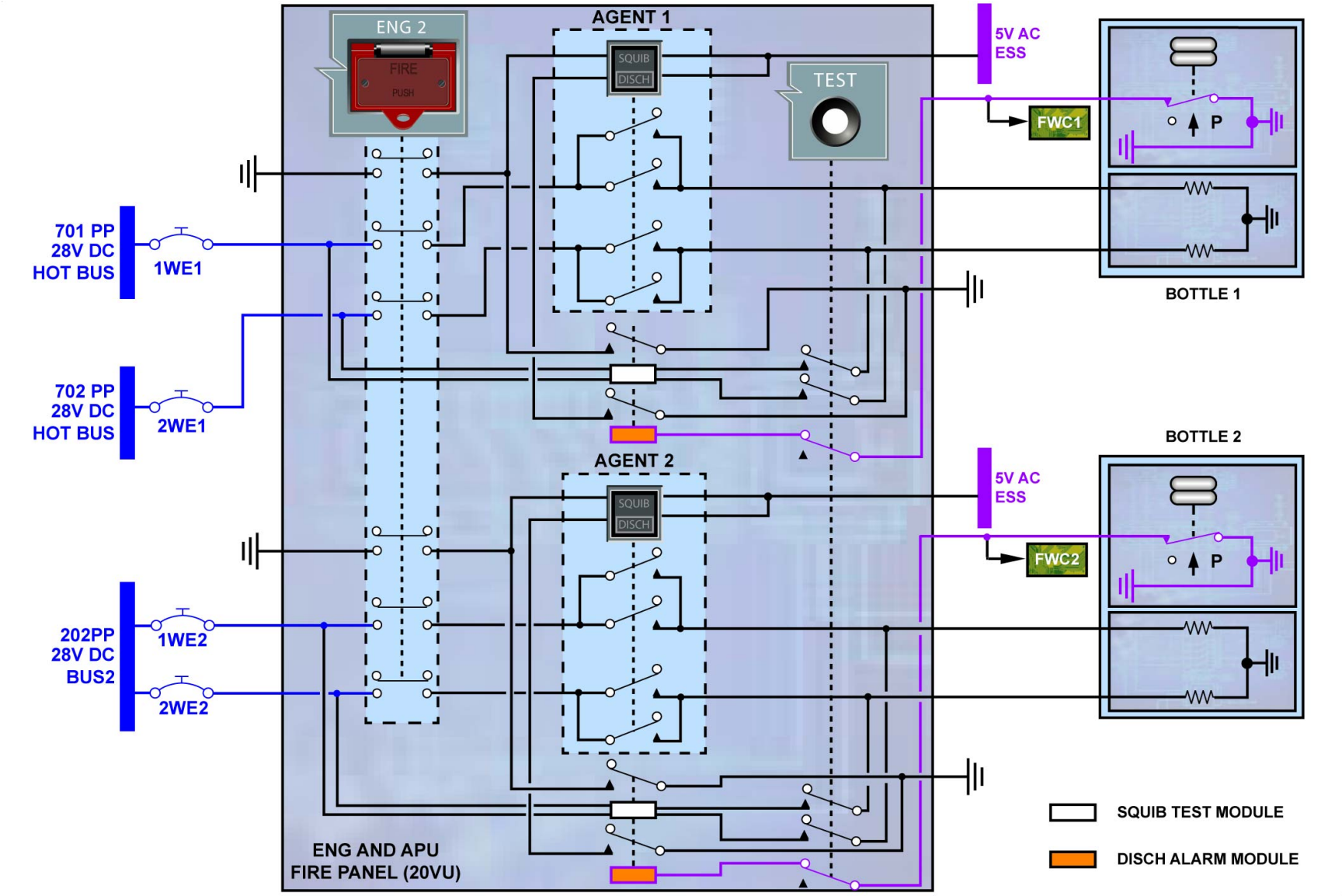
FIRE DETECTION CIRCUIT

ELECTRICAL CIRCUITS (3)

FIRE EXTINGUISHING CIRCUIT

The engine fire extinguishing system is supplied by electrical power from the DC system. For each engine the system comprises one ENGine FIRE P/BSW, two SQUIB/DISCHarge P/BSWs and one TEST P/B located on the ENG and APU FIRE panel; and two fire extinguishing bottles located in the engine pylon.

UGB13131 - U7ST0M0 - UM26O4000000001



FIRE EXTINGUISHING CIRCUIT

UGB13131 - U7ST0M0 - UM26O4000000001

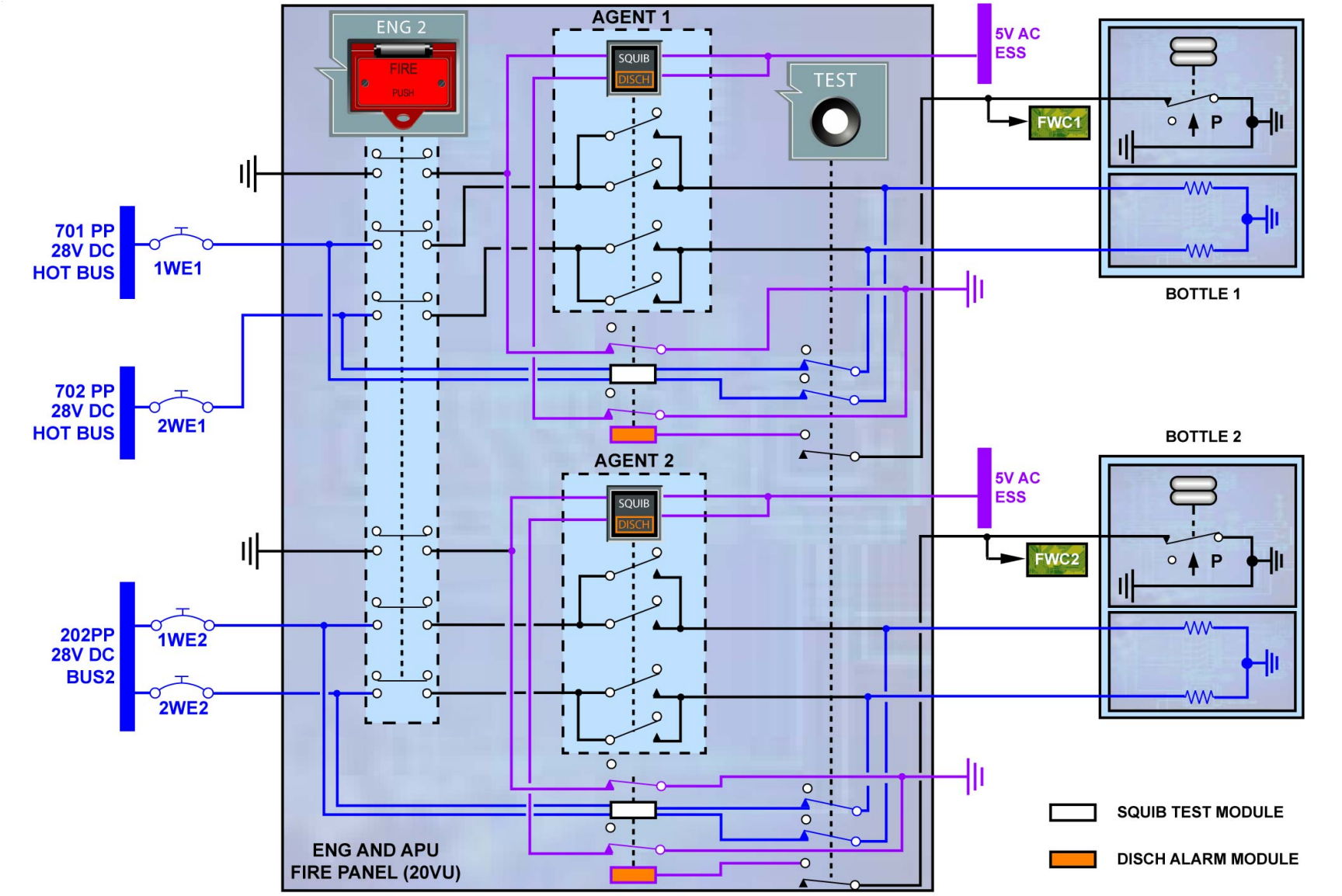
ELECTRICAL CIRCUITS (3)

FIRE EXTINGUISHING CIRCUIT (continued)

TEST PUSHBUTTON

The operational test lets the pilot monitor and activate the fire protection system. It can be done on the ground or in flight. Each engine has its TEST P/B which must be pushed and held when doing the test. When the TEST P/B is pressed, the fire warning indications are triggered on the related engine section on the ENG and APU FIRE panel. Each TEST P/B lets the crew check the condition of the fire detectors, the FDU, and the indication warnings. It initiates the loops and squib tests.

UGB13131 - U7ST0M0 - UM26O4000000001



FIRE EXTINGUISHING CIRCUIT - TEST PUSHBUTTON

UGB13131 - U7ST0M0 - UM26O4000000001

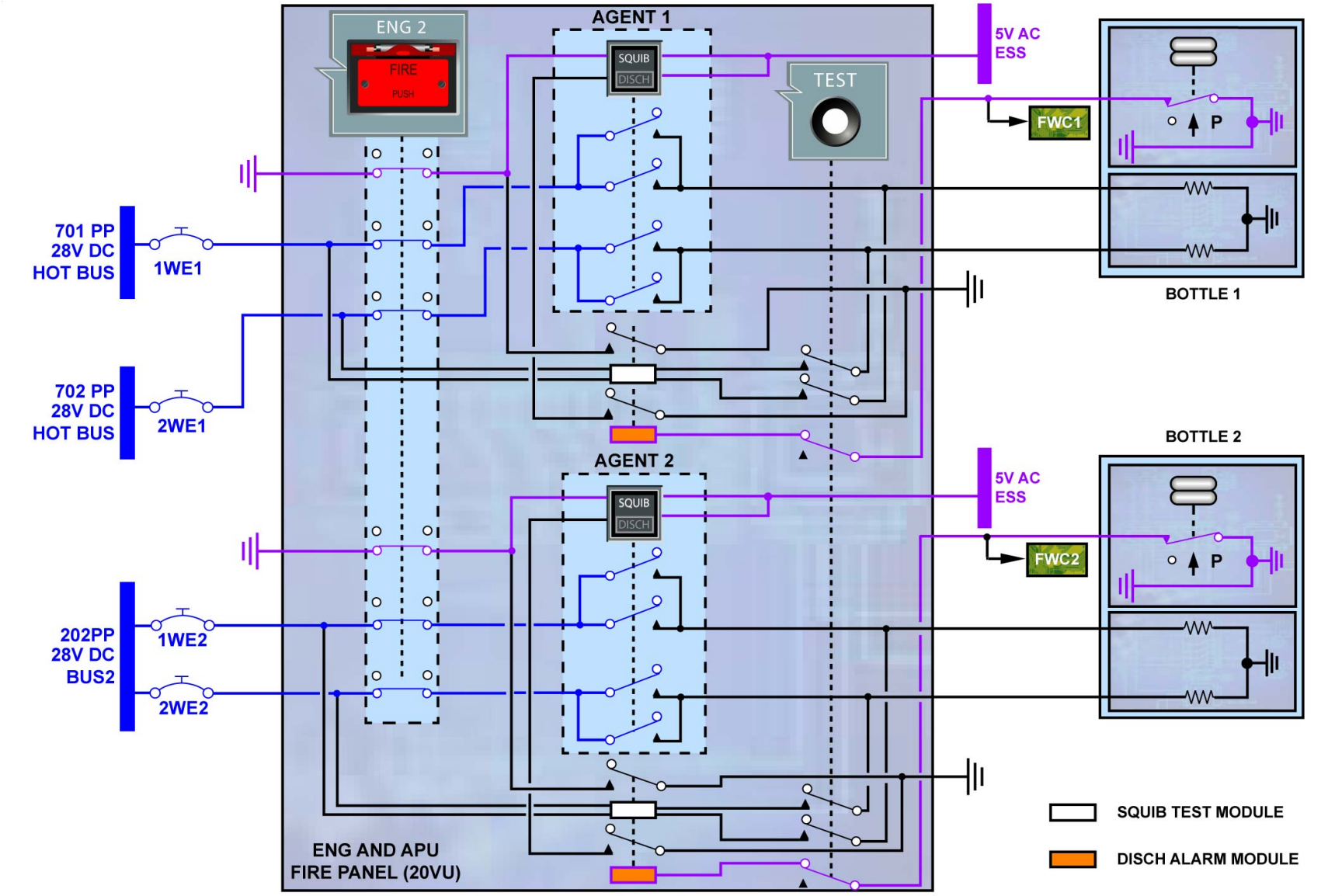
ELECTRICAL CIRCUITS (3)

FIRE EXTINGUISHING CIRCUIT (continued)

ENGINE 2 FIRE PUSHBUTTON

Pushing the ENG 2 FIRE P/BSW arms the engine 2 fire extinguishing bottles firing system. The SQUIB lights come on to indicate that fire bottles can be used. At the same time the engine is isolated from the rest of the aircraft systems.

UGB13131 - U7ST0M0 - UM26O4000000001



FIRE EXTINGUISHING CIRCUIT - ENGINE 2 FIRE PUSHBUTTON

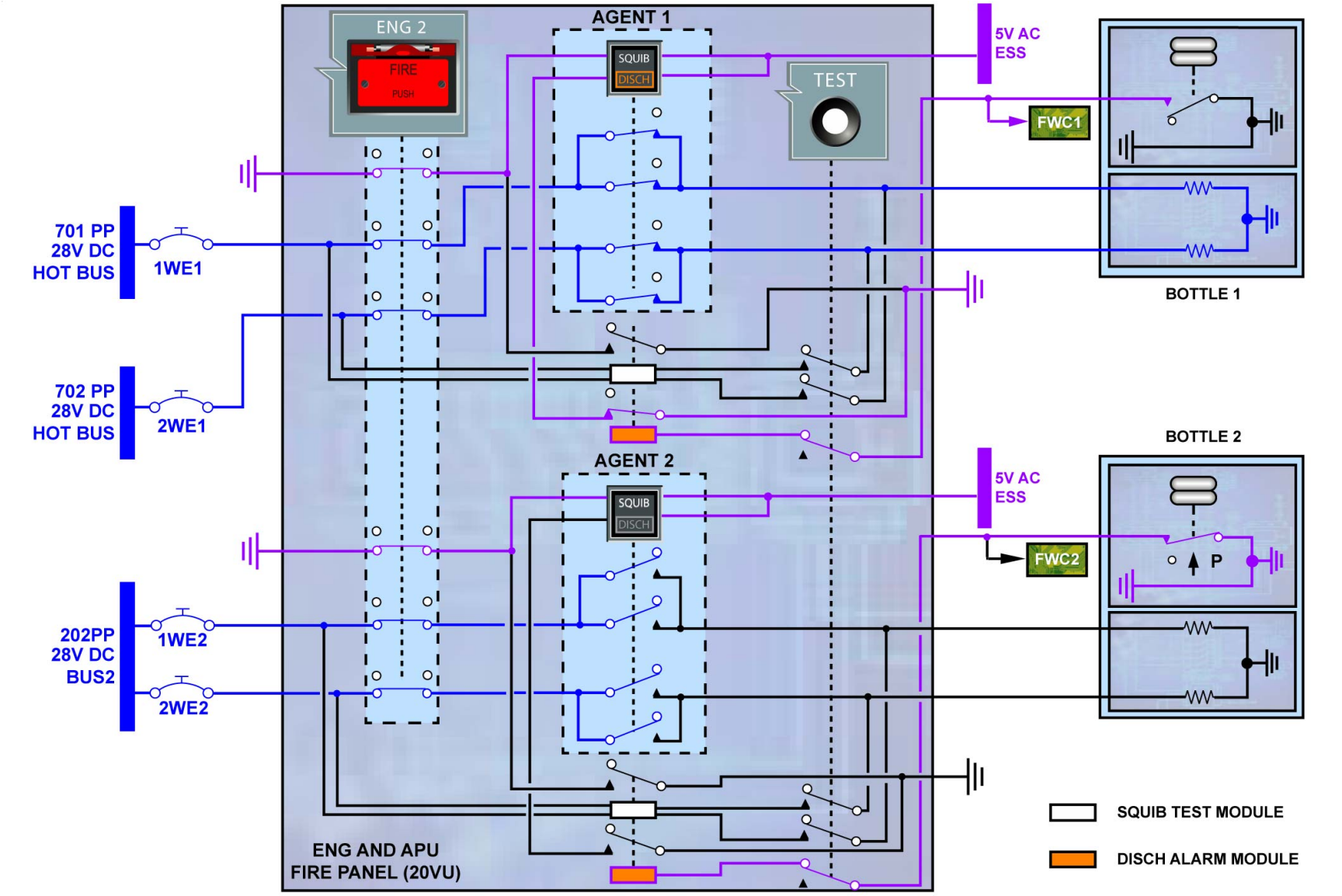
ELECTRICAL CIRCUITS (3)

FIRE EXTINGUISHING CIRCUIT (continued)

DISCH PUSHBUTTON

When the AGENT 1 P/BSW is selected the extinguishing agent flows in the rigid pipes and is immediately sprayed in the engine zones. The amber DISCH legend comes on when the fire extinguisher bottle is completely discharged. The DISCH alarm module sends the related signal to the Flight Warning Computer (FWC).

UGB13131 - U7ST0M0 - UM26O4000000001



FIRE EXTINGUISHING CIRCUIT - DISCH PUSHBUTTON

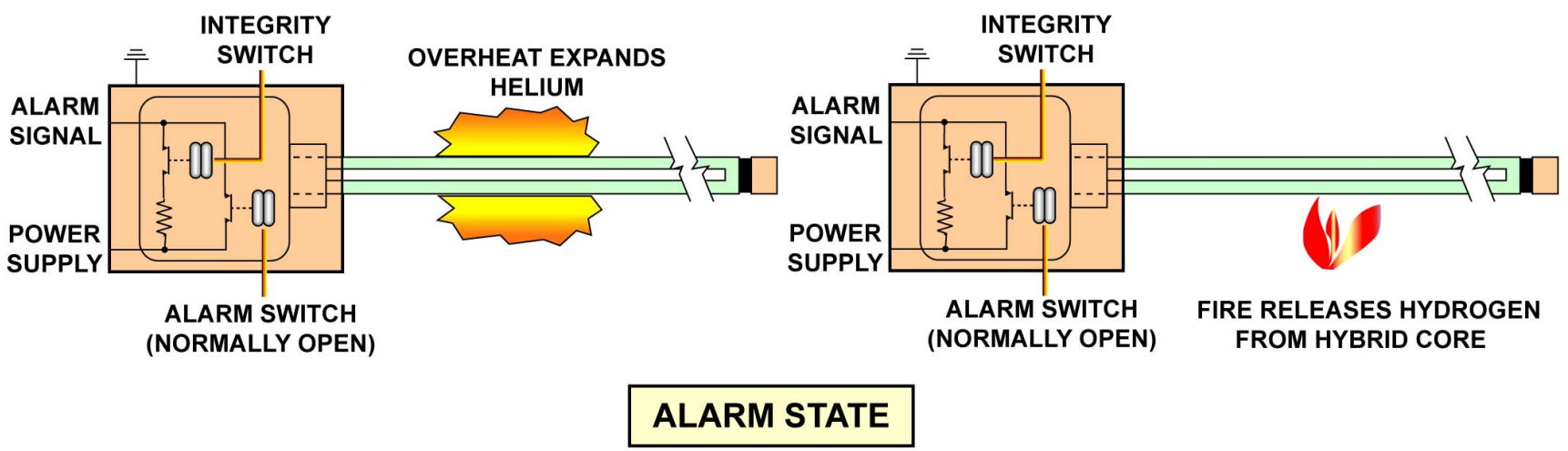
UGB13131 - U7ST0M0 - UM26O4000000001

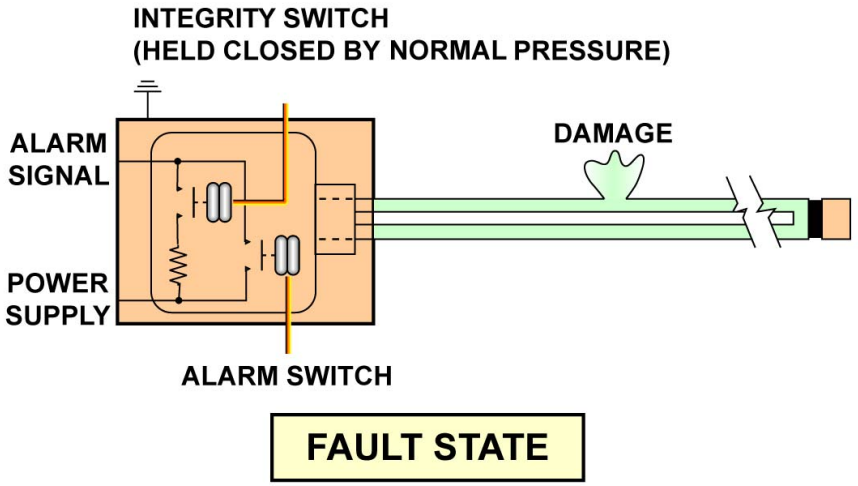
APU FIRE DETECTION LOGIC (3)

FIRE DETECTORS STATE

In NORMAL STATE, the INTEGRITY switch is closed and the ALARM switch is open.
In ALARM STATE:
The effect of an average temperature expands the helium (inert) gas, which in turn closes the ALARM switch, or the effect of heat caused by a flame or hot gas, releases core (active) gas from the hybrid core, which in turn closes the ALARM switch.
In both cases, the detector sends a fire signal.
In FAULT STATE:
In the event of gas pressure loss (pipe fracture or cut off due to a torching flame), the INTEGRITY switch opens and generates a fault signal.

UGB13131 - U7ST0M0 - UM26D5000000001





FIRE DETECTORS STATE

APU FIRE DETECTION LOGIC (3)

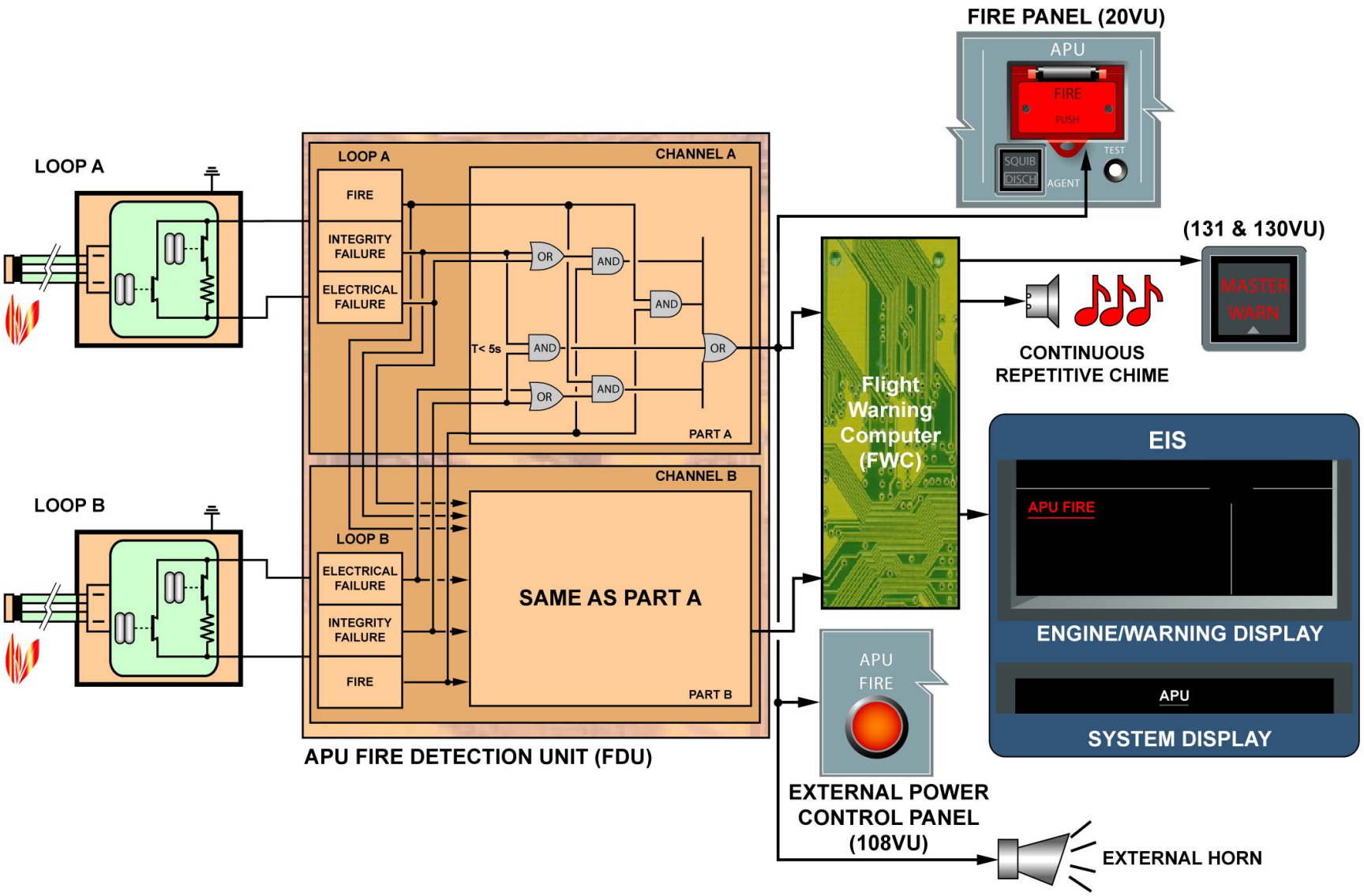
GENERAL

The APU Fire Detection Unit (FDU) has two channels capable of detecting any case of APU fire and loop failure. Each channel does the same detection logic depending on the loop A and loop B status.

FIRE WARNING

In case of a fire detected on both loops or on one loop with the other faulty, the channels send a fire warning to the APU FIRE panel, EXTernal PoWeR control panel, MASTER WARN and ECAM displays. The FDU supplies a fire warning signal if any of the following conditions are met:
- fire on loop A and fire on loop B,
- fire on loop A and fault on loop B,
- fault on loop A and fire on loop B,
- fault on loop A and fault on loop B within 5 seconds (both loops broken due to a torching flame).

UGB13131 - U7ST0M0 - UM26D5000000001



GENERAL & FIRE WARNING

APU FIRE DETECTION LOGIC (3)

LOOP FAULT WARNING

In case of a loop failure the FDU supplies a loop fault warning signal to the ECAM and Centralized Fault Display Interface Unit (CFDIU). The FDU supplies an inoperative signal if any of the following conditions are met:
- electrical failure,
- integrity failure,
- detection of a single loop fire during more than 16 s while the other loop is in normal condition.

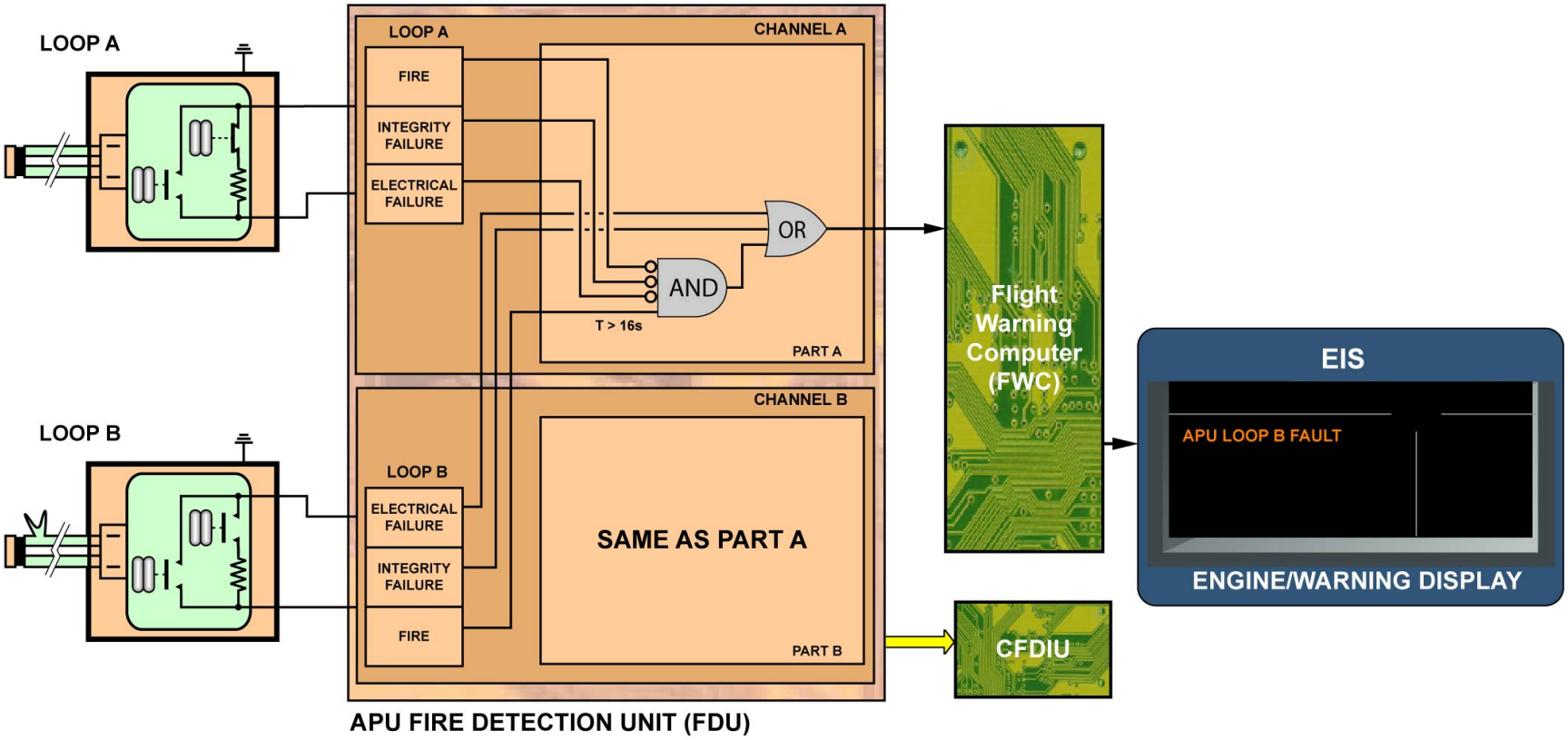
ELECTRICAL FAILURE

An electrical failure is signaled by a loop fault message if there is a loss of electrical power of the APU fire detection system.

INTEGRITY FAILURE

An integrity failure is signaled by a loop fault message if there is a loss of pressure in a fire sensor element.

UGB13131 - U7ST0M0 - UM26D5000000001



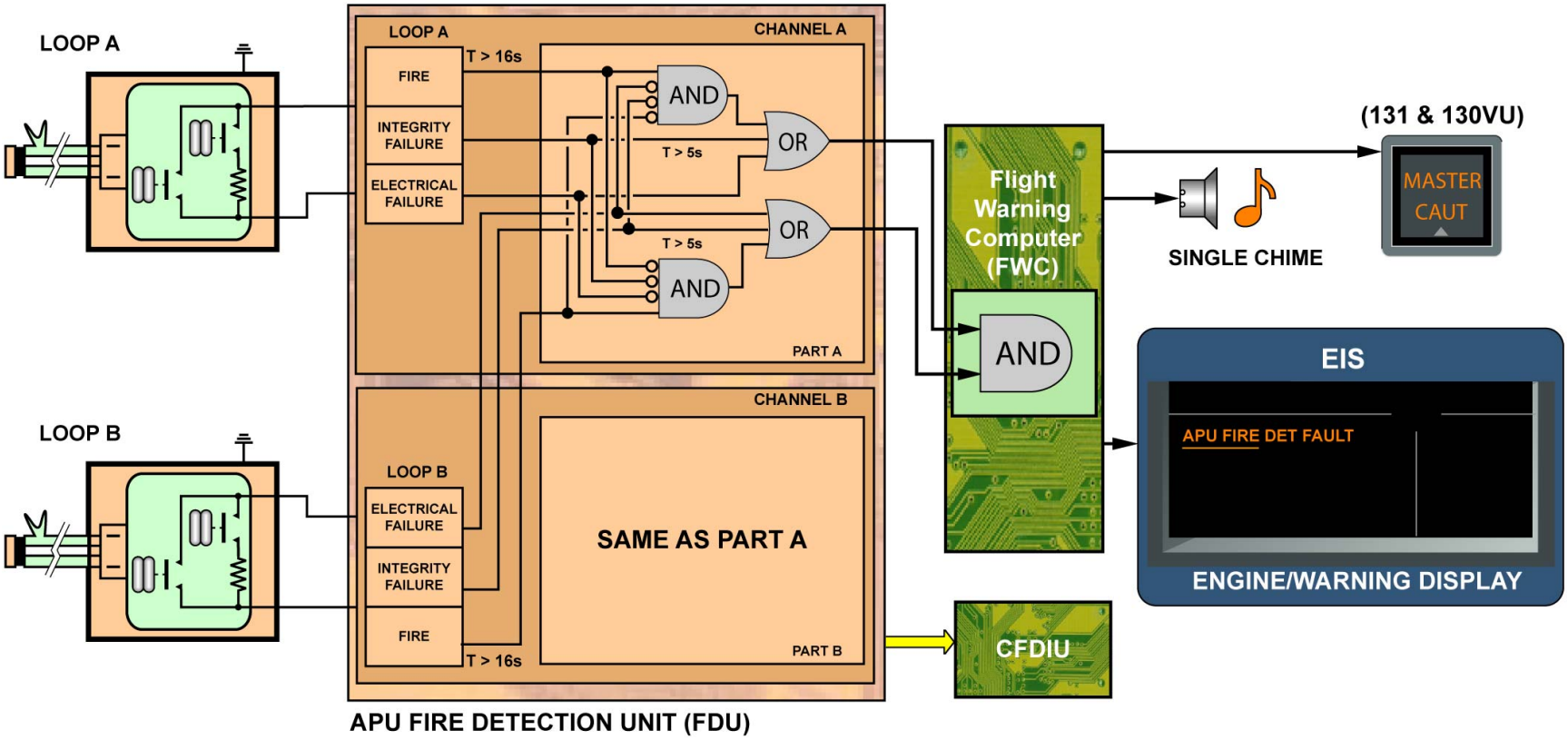
LOOP FAULT WARNING - ELECTRICAL FAILURE & INTEGRITY FAILURE

APU FIRE DETECTION LOGIC (3)

DETECTION FAULT WARNING

The detection fault logic is based on a dual loop failure. It agrees with a total loss of the detection system. When the FDU supplies two inoperative signals related to loop A and loop B fault logic, the Flight Warning Computer (FWC) elaborates a detection fault warning.

UGB13131 - U7ST0M0 - UM26D5000000001



DETECTION FAULT WARNING

APU FIRE PUSHBUTTON INTERFACES (3)

GENERAL

During the APU fire procedure, the APU FIRE PUSHbutton switch is manually released out. This triggers several automatic sequences simplifying further crew actions and system monitoring.

MONITORING INTERFACES

Releasing the FIRE P/BSW out cancels the Continuous Repetitive Chime (CRC), signals the action to the Flight Warning Computer (FWC), for further management of other warnings and messages and the SQUIB light comes on, on the APU fire control panel.

SUPPLY INTERFACES

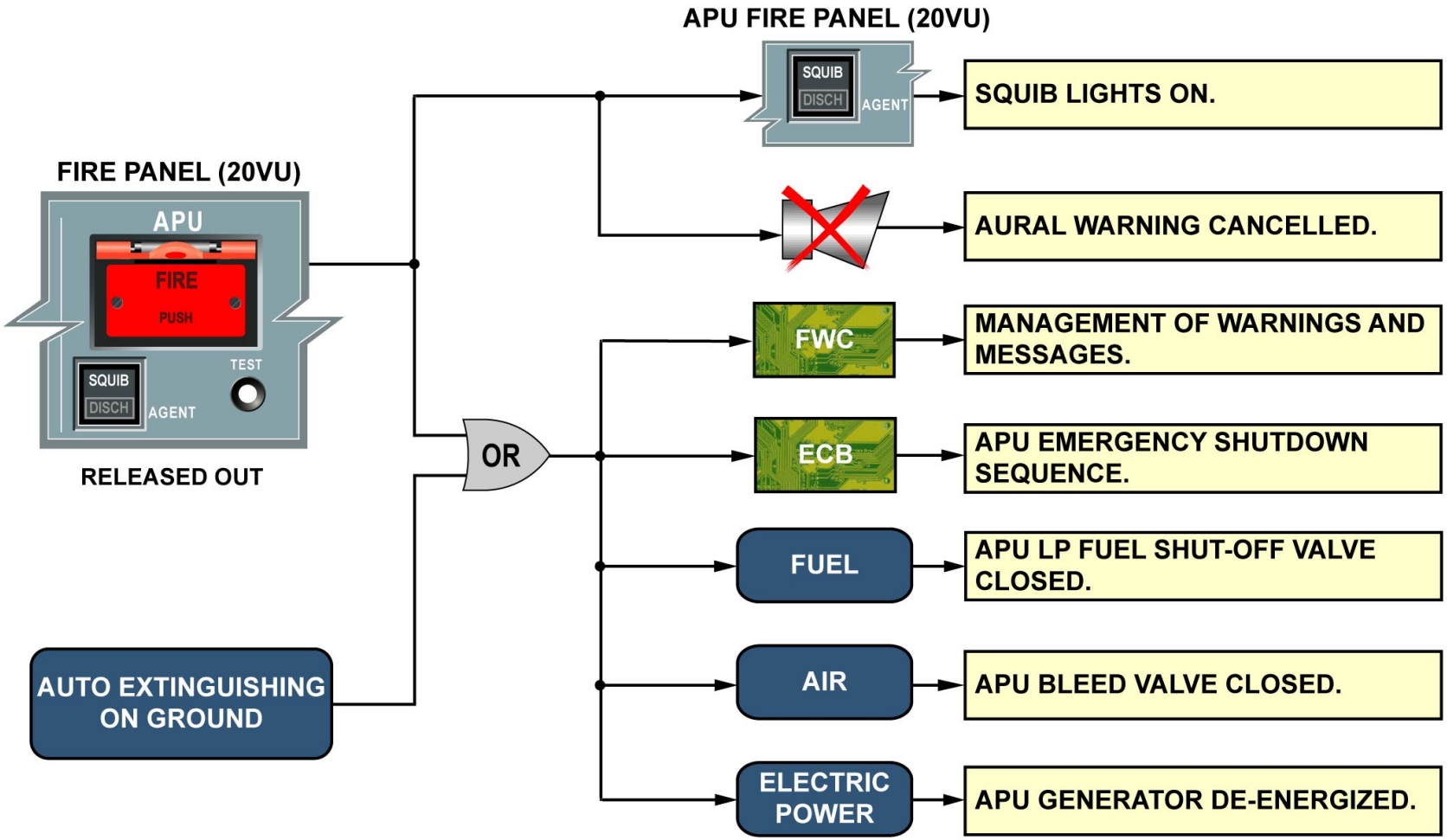
Quick isolation of all systems on the APU, which could be the origin of the fire or feed the fire, is achieved as soon as the FIRE P/BSW is released out. These systems are:
- fuel,
- air,
- electric power.

The Electronic Control Box (ECB) of the APU is triggered to initiate an emergency APU shutdown.

AUTO EXTINGUISHING ON GROUND

When an APU fire is detected on ground, the APU shuts down automatically and the fire extinguishing system is automatically triggered.

UGB13131 - U7ST0M0 - UM26F2000000001



GENERAL ... AUTO EXTINGUISHING ON GROUND

SYSTEM OPERATION IN CASE OF APU FIRE (3)

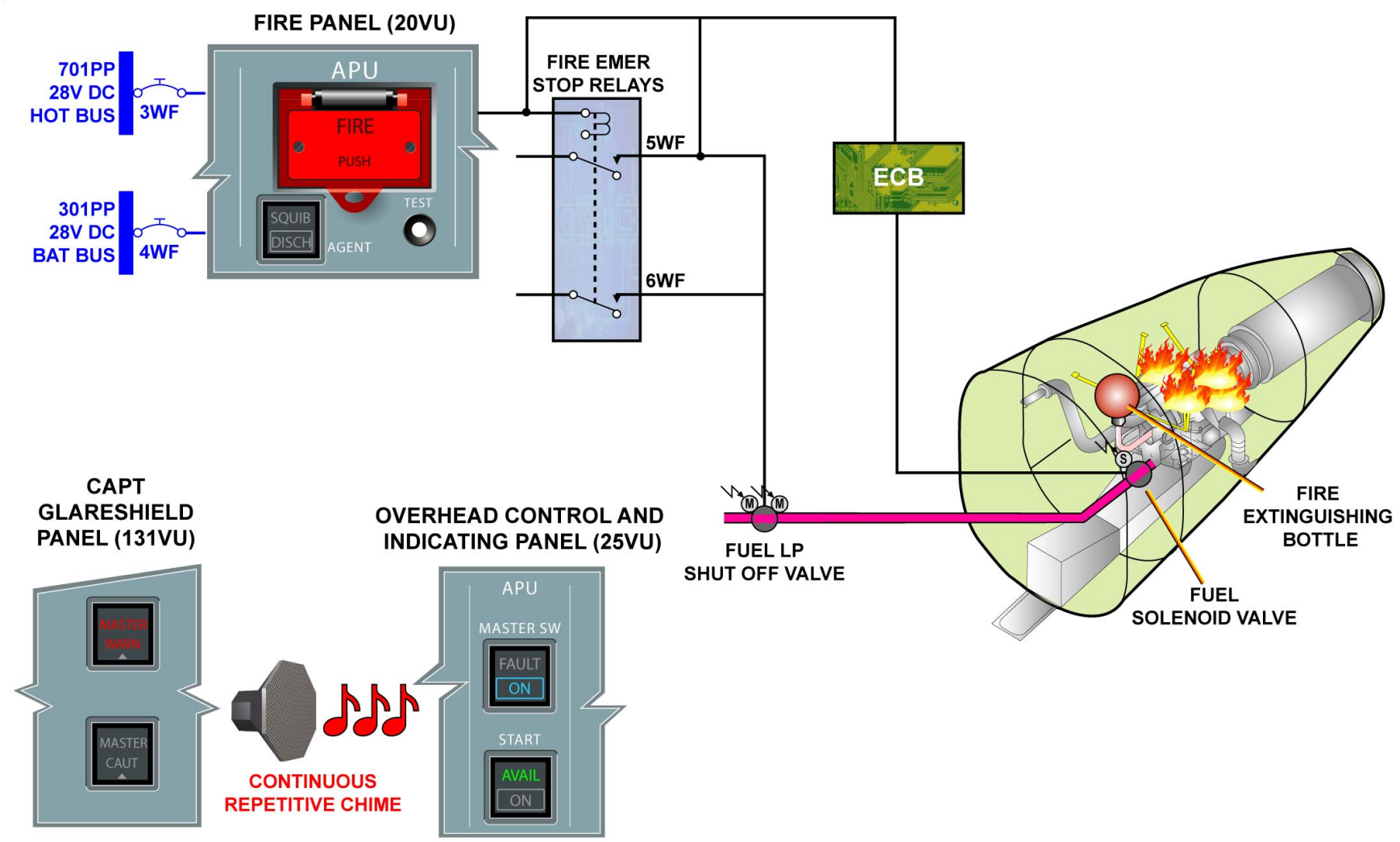
GENERAL

The aircraft is in flight and the APU is running.

FIRE DETECTION

When a fire is detected, the Continuous Repetitive Chime (CRC) sounds, the MASTER WARNing flashes and the APU FIRE PUSH button switch light on the APU FIRE panel comes on.

UGB13131 - U7ST0M0 - UM26D600000001



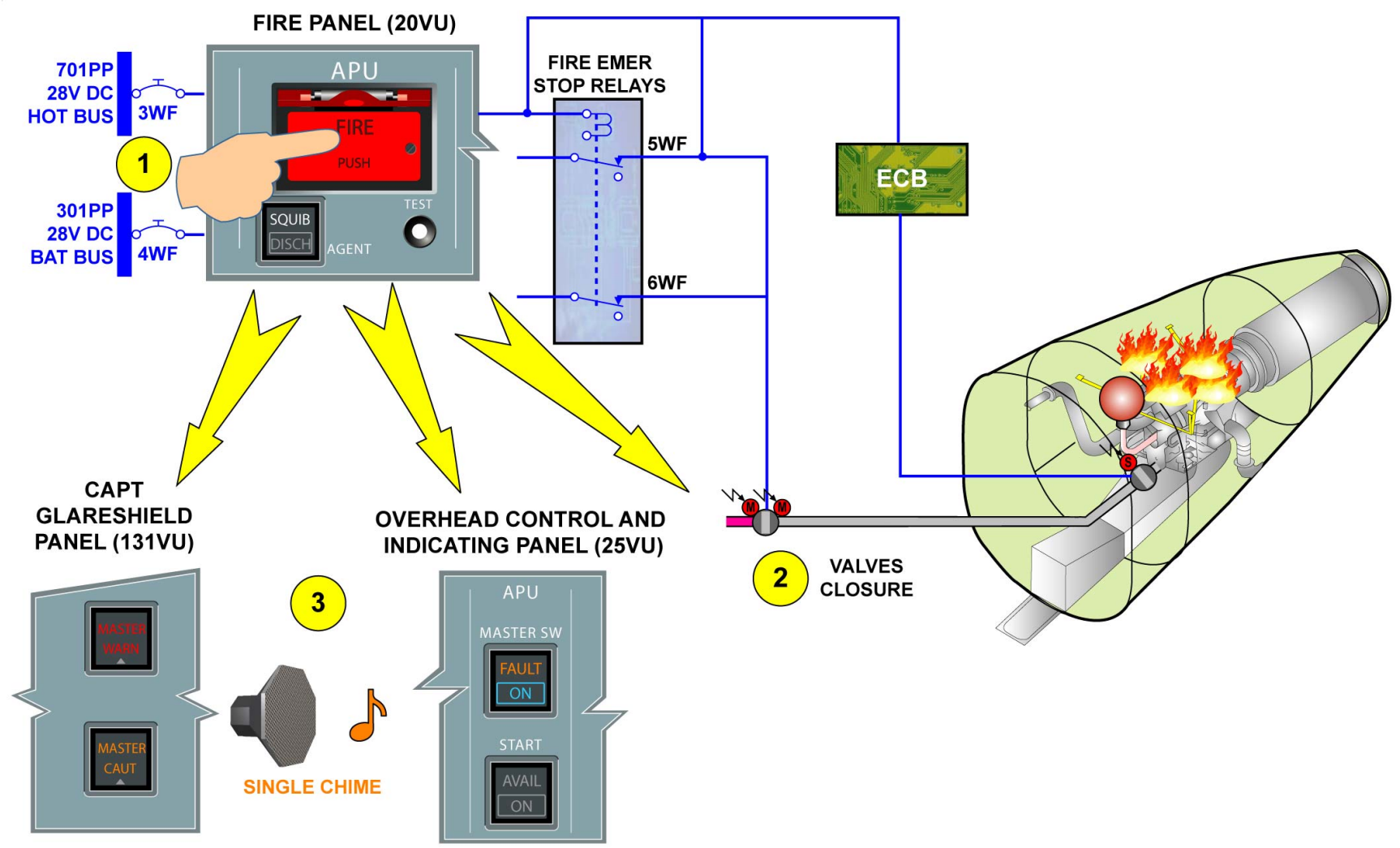
GENERAL & FIRE DETECTION

SYSTEM OPERATION IN CASE OF APU FIRE (3)

APU ISOLATION

To isolate the APU, the APU FIRE PUSH button switch must be released out. In this case, the CRC stops, the fuel low pressure shutoff valve and the fuel solenoid valve close and cause APU shutdown. The Single Chime (SC) sounds, the MASTER CAUTion and the FAULT light on the APU MASTER SWitch P/B come on. The SQUIB light comes on to indicate that the AGENT P/BSW can be used.

UGB13131 - U7ST0M0 - UM26D600000001



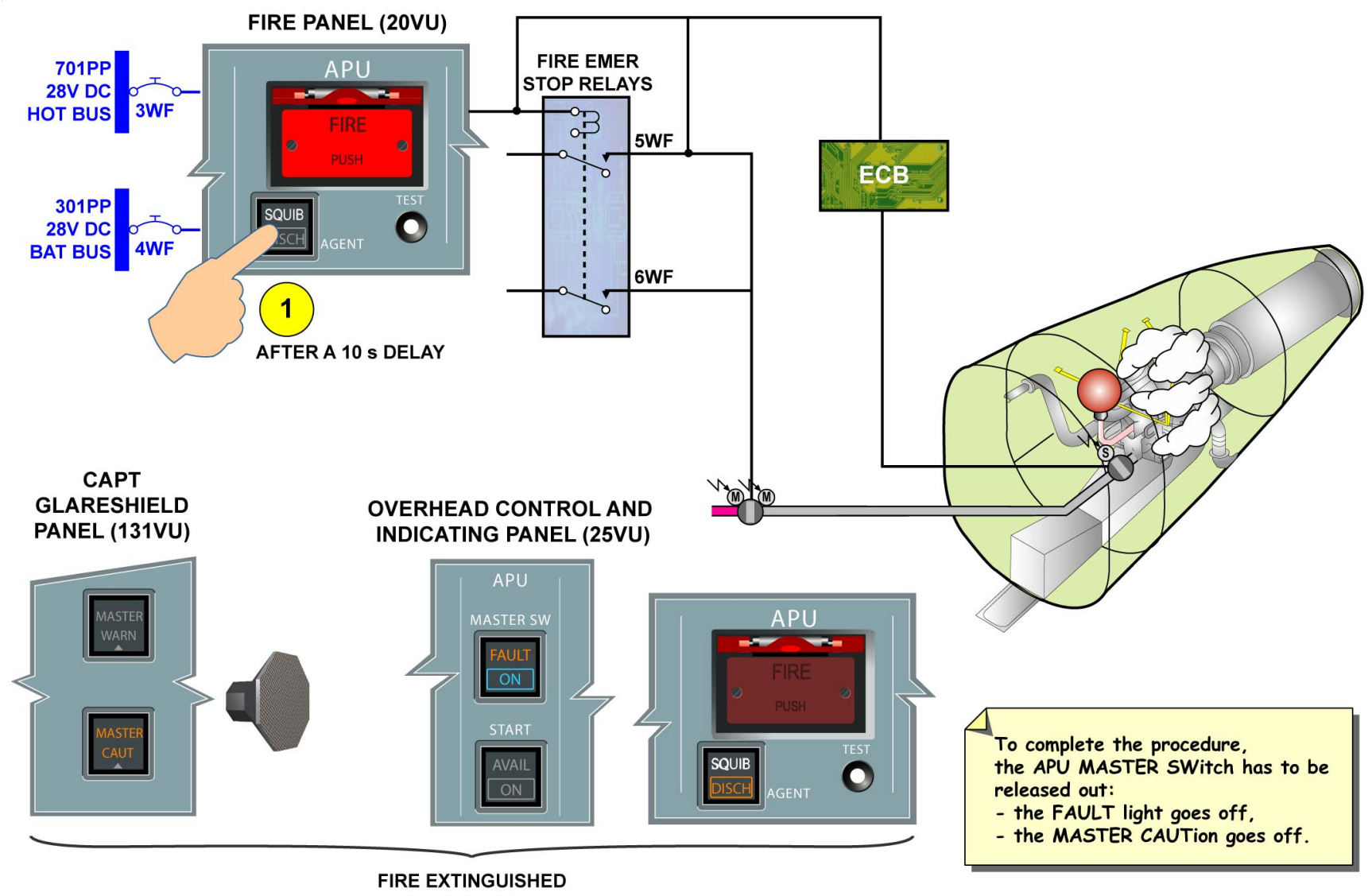
APU ISOLATION

SYSTEM OPERATION IN CASE OF APU FIRE (3)

FIRE EXTINGUISHING

A 10 s delay allows the airflow to reduce, this increases the agent effect. Then AGENT P/BSW must be pressed in. The fire bottle is discharged in the APU compartment and the DISCHarge light comes on. When the fire is extinguished, the MASTER WARN and the APU FIRE PUSH button switch lights go off. The APU MASTER SW P/B has to be released out; when this is done the FAULT light and the MASTER CAUT go off. This completes the procedure.

UGB13131 - U7ST0M0 - UM26D600000001



FIRE EXTINGUISHING

AUTO EXTINGUISHING ON GROUND (2)

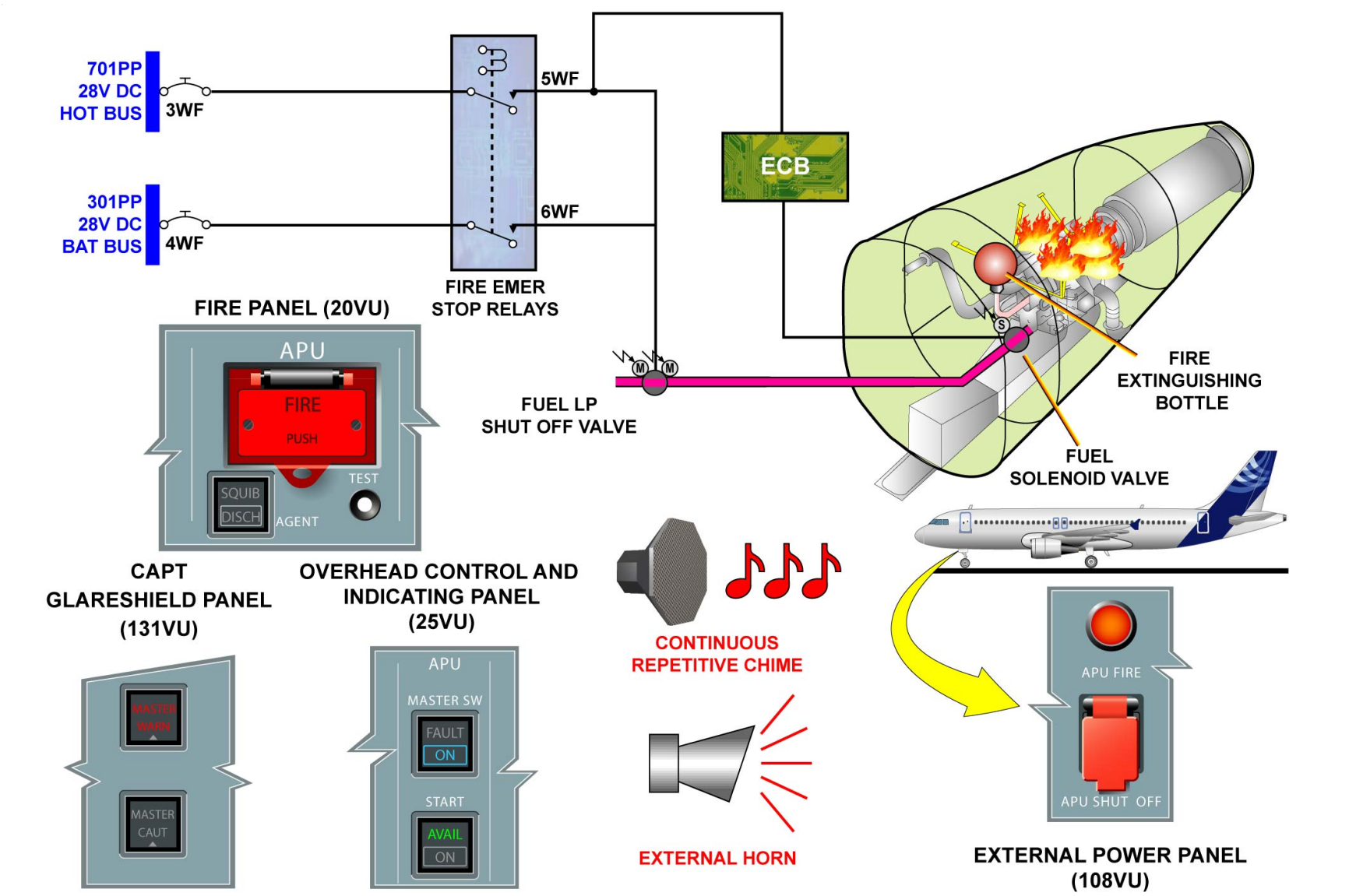
GENERAL

The aircraft is on ground, and the APU is running without supervision.

FIRE DETECTION

When a fire is detected, the Continuous Repetitive Chime (CRC) sounds, the MASTER WARNing flashes and the APU FIRE PUSH button switch light on the APU FIRE panel comes on. The APU FIRE light on the EXTernal PoWeR panel comes on, and the external horn sounds.

UGB13131 - U7ST0M0 - UM26D7000000001

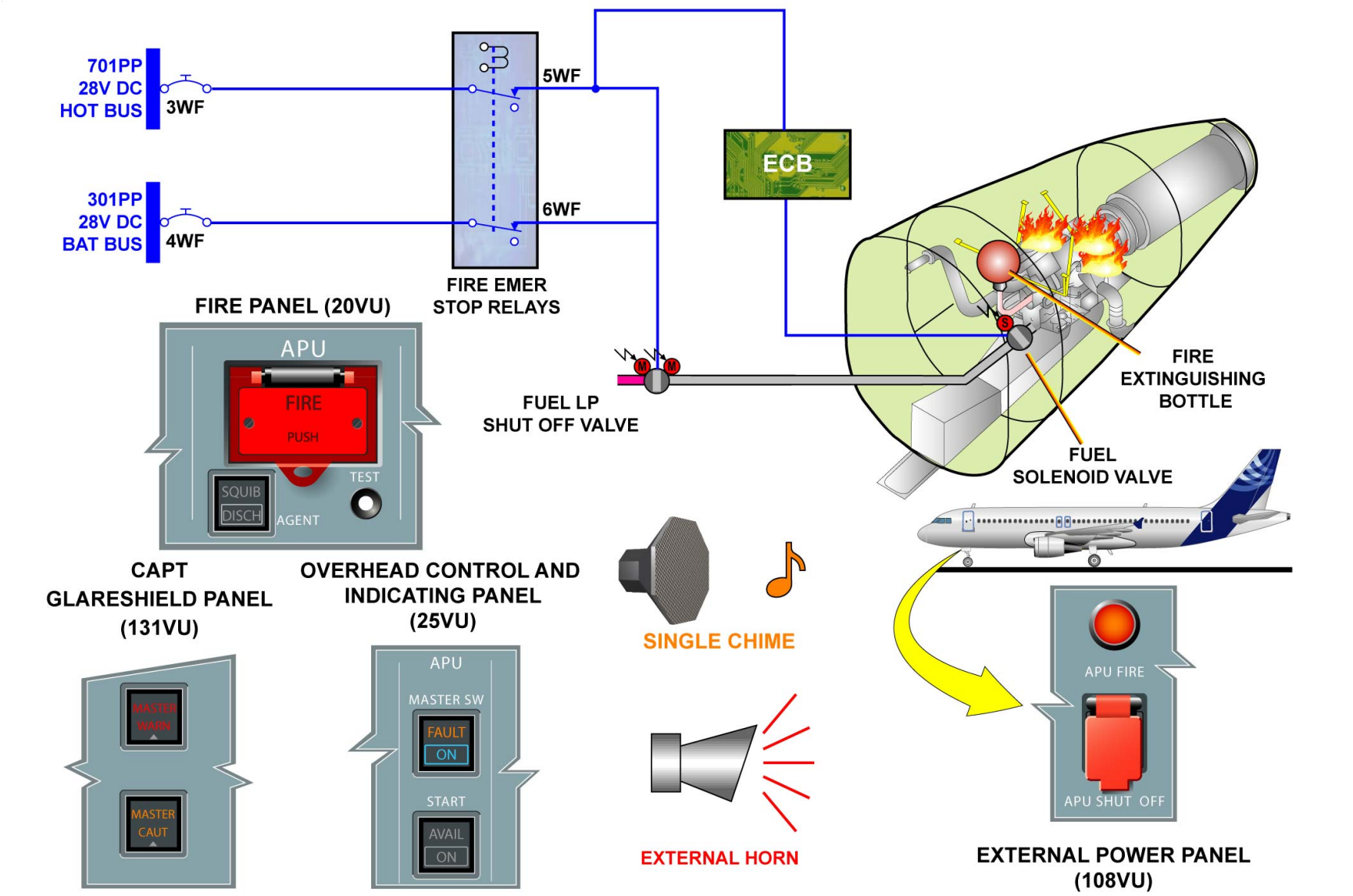


GENERAL & FIRE DETECTION

AUTO EXTINGUISHING ON GROUND (2)

APU ISOLATION

The fuel low pressure shut off valve and the fuel solenoid valve close and the APU shuts down. The Single Chime (SC) sounds, the MASTER CAUTion and the FAULT light on the APU MASTER SWitch button come on.



APU ISOLATION

AUTO EXTINGUISHING ON GROUND (2)

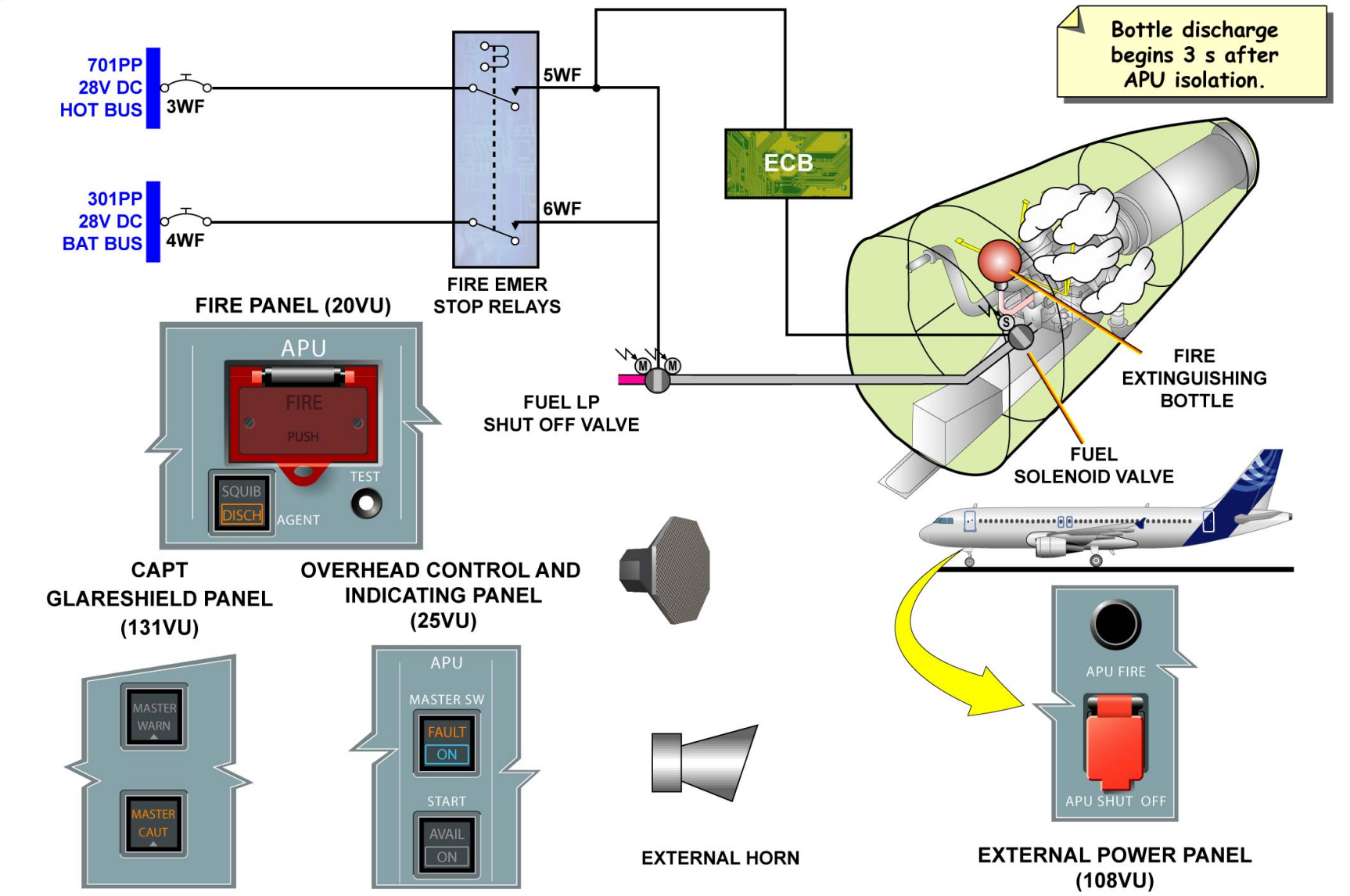
FIRE EXTINGUISHING

Three seconds after APU isolation, the APU fire bottle is discharged automatically and the DISCHarge light on the AGENT P/BSW comes on.

FIRE EXTINGUISHED

When the fire is extinguished, the MASTER WARN, the APU FIRE PUSH button switch light on the APU FIRE panel and the APU FIRE light on the EXT PWR panel go off, the external horn stops.

NOTE: Note: It is not necessary to use the APU SHUT OFF switch on the EXT PWR panel in case of APU fire auto extinguishing.



FIRE EXTINGUISHING - FIRE EXTINGUISHED

PRECAUTIONS (3)

GENERAL

Specific precautions must be taken during removal or installation of a fire extinguishing bottle and a discharge cartridge.

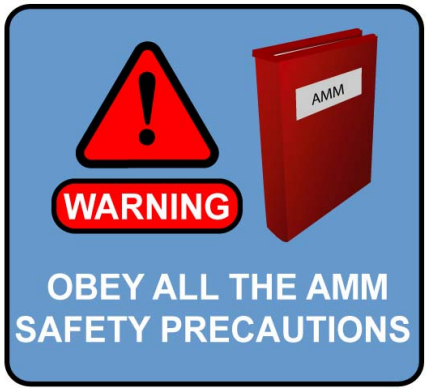
FIRE BOTTLE

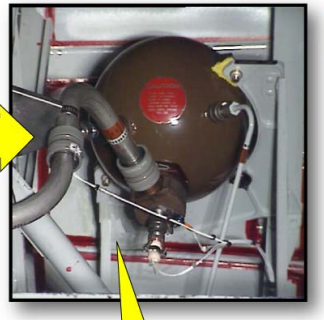
WARNING: The fire bottle cartridges are explosive. Remove them before working on the bottle. Protective caps must be installed during bottle removal/installation to prevent damage to discharge diaphragm, which could result in injury to personnel.

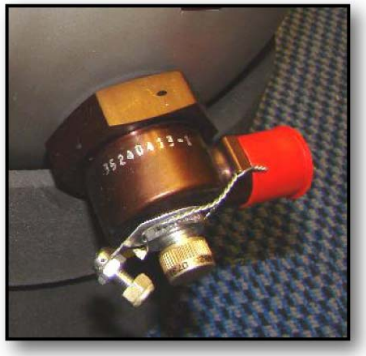
DISCHARGE CARTRIDGE

WARNING: Before power is supplied to the A/C make sure that electrical circuits upon which work is in progress are isolated. Cartridges are class "C" explosives and must be handled or stored by authorized personnel or disposed of by an approved method. When cartridge electrical connectors are disconnected, the cartridge electrical pins must be shunted with a protective shunt, which is given by the manufacturer. A shunt plug or shorting clip will prevent bottle discharge, which could cause injury to maintenance personnel. The cartridge installed must be of the same make as the fire bottle and agreed with the specification indicated in the AMM.

UGB13131 - U7ST0M0 - UM26O2000000001

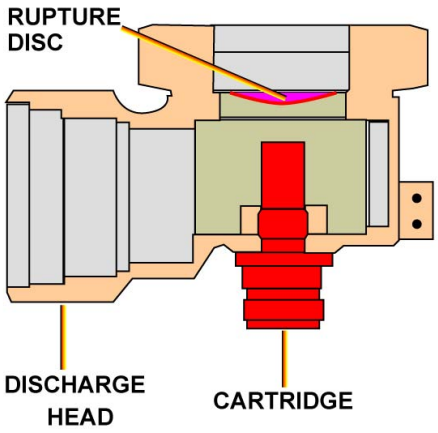


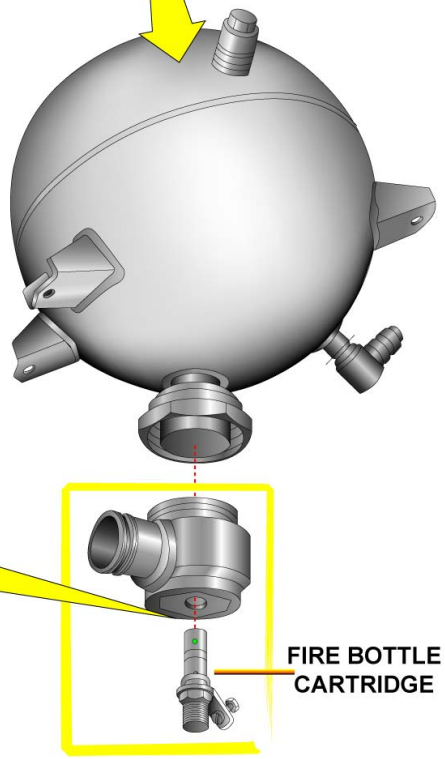




PROTECTIVE CAP

AUTHORIZED PERSONNEL ONLY





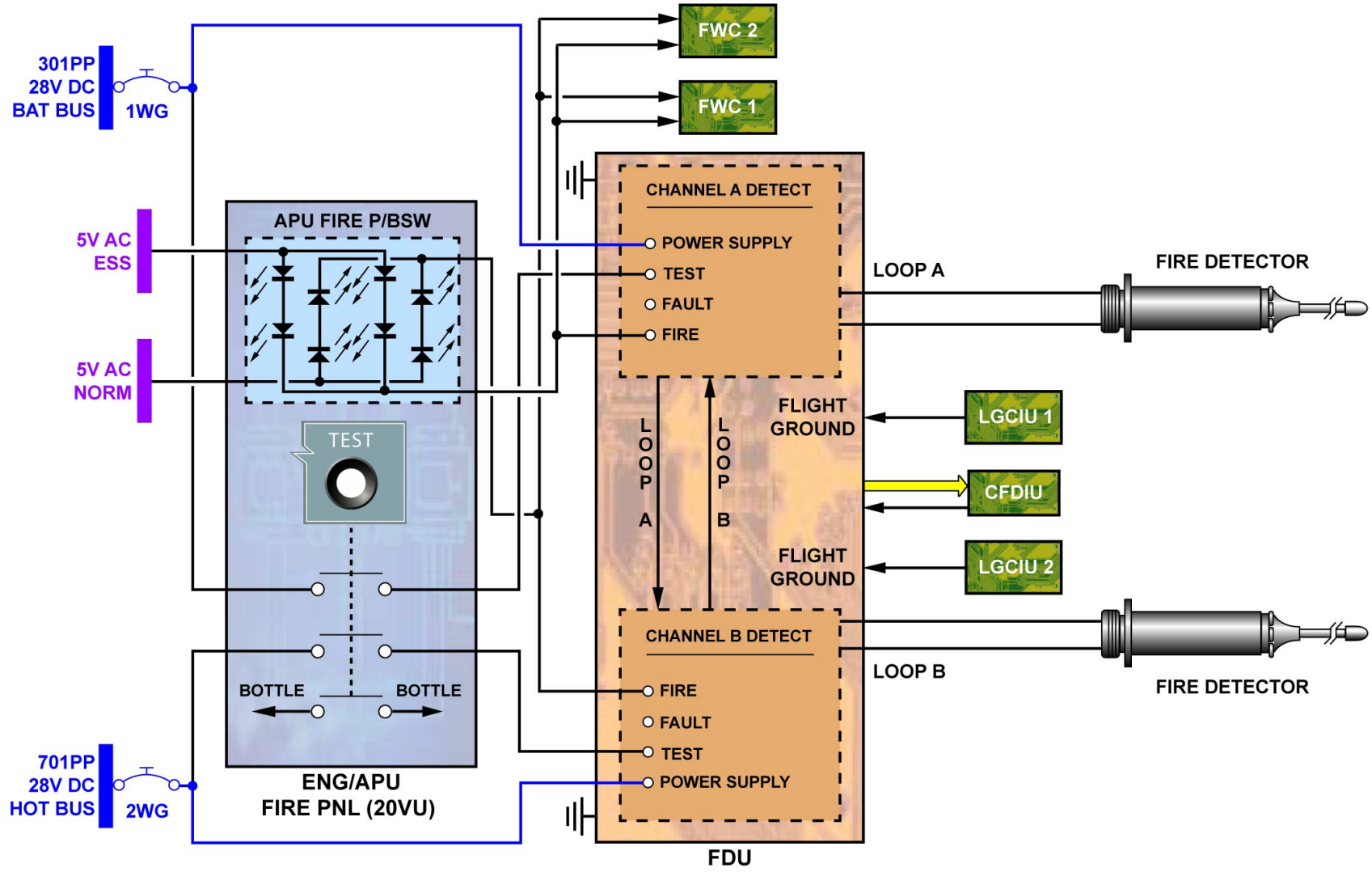
GENERAL ... DISCHARGE CARTRIDGE

ELECTRICAL CIRCUITS (3)

DETECTION CIRCUIT

The APU fire and overheat detection system is supplied by the aircraft DC electrical power. The detection system has two identical and electrically independent loops connected in parallel to a Fire Detection Unit (FDU). Each FDU has two identical channels: channel A and B. Each one has its own power supply and is connected to one fire detection loop.

UGB13131 - U7ST0M0 - UM26O5000000001



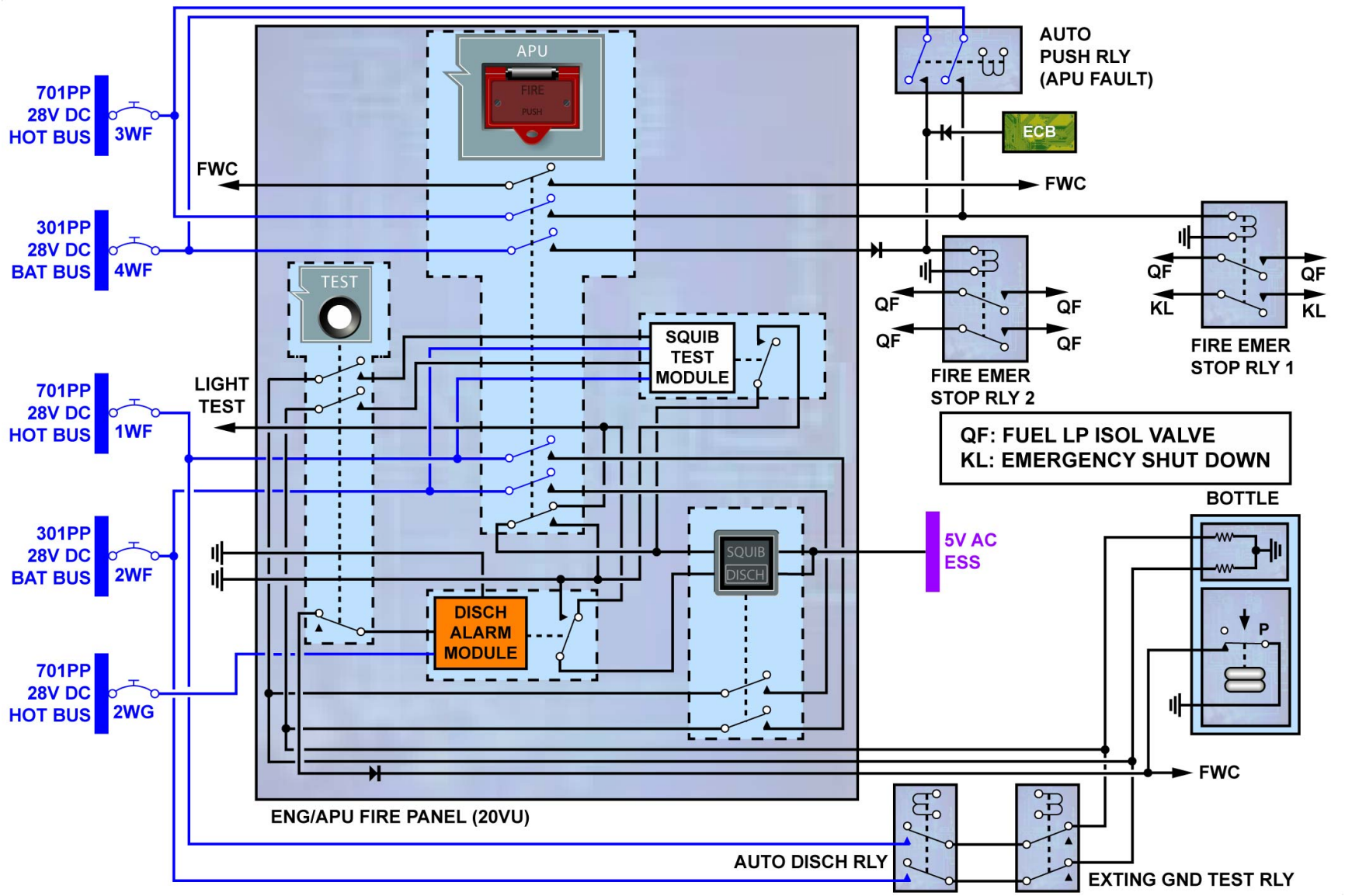
DETECTION CIRCUIT

ELECTRICAL CIRCUITS (3)

EXTINGUISHING CIRCUIT

The APU fire extinguishing system gets the electrical power from the DC system of the aircraft. The system has an APU FIRE PUSH button switch, a SQUIB/DISCHarge P/BSW and one TEST P/BSW located on the ENGine and APU FIRE panel. A fire extinguishing bottle is installed forward the APU compartment firewall.

UGB13131 - U7ST0M0 - UM26O5000000001



EXTINGUISHING CIRCUIT

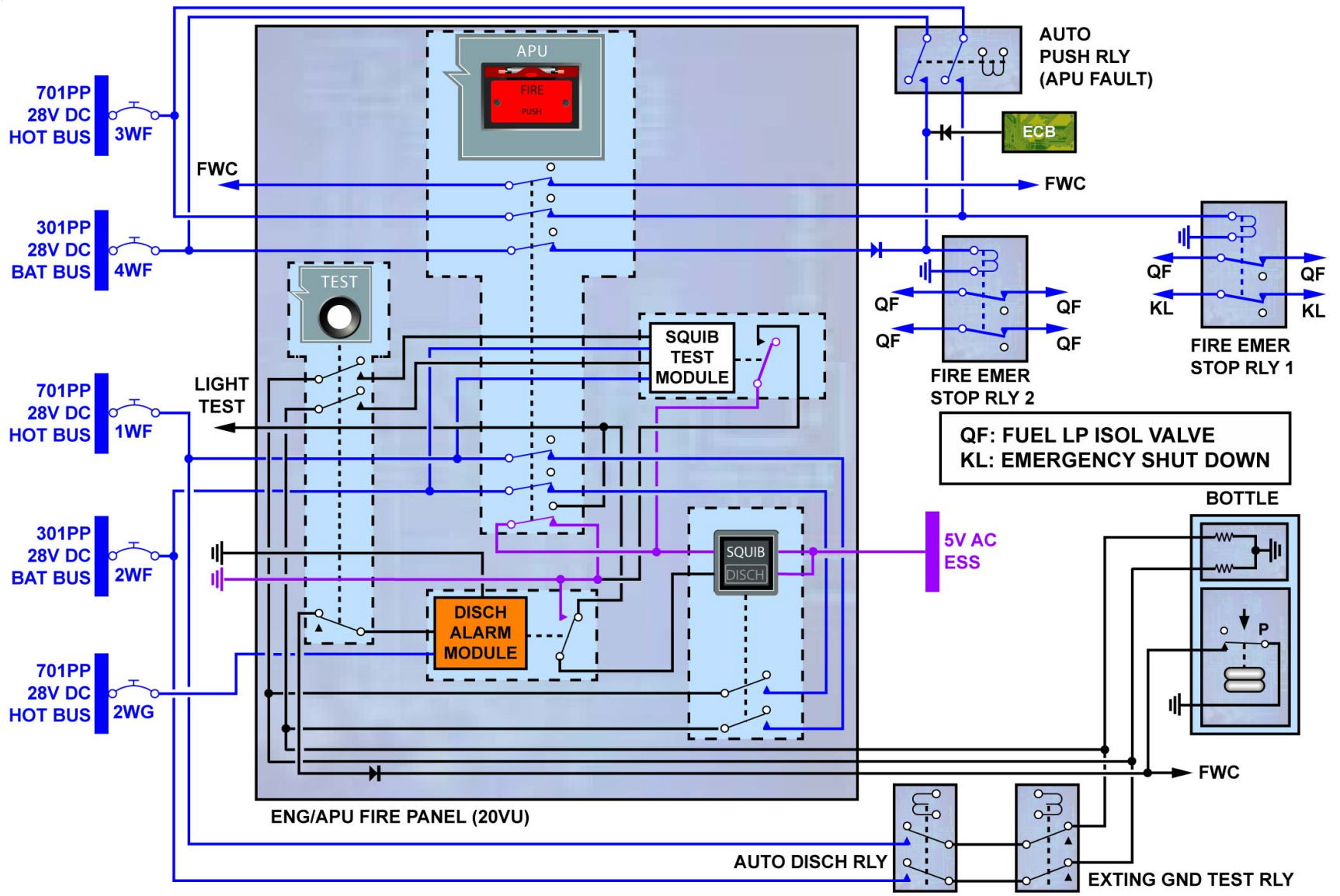
ELECTRICAL CIRCUITS (3)

EXTINGUISHING CIRCUIT (continued)

APU FIRE PUSHBUTTON

When fire is detected, the APU FIRE PUSH button switch light comes on. Pushing this P/BSW arms the APU fire extinguishing bottle firing system. The SQUIB light comes on to indicate that fire bottle can be used. At the same time the APU is isolated from the rest of the aircraft systems.

UGB13131 - U7ST0M0 - UM26O5000000001



EXTINGUISHING CIRCUIT - APU FIRE PUSHBUTTON

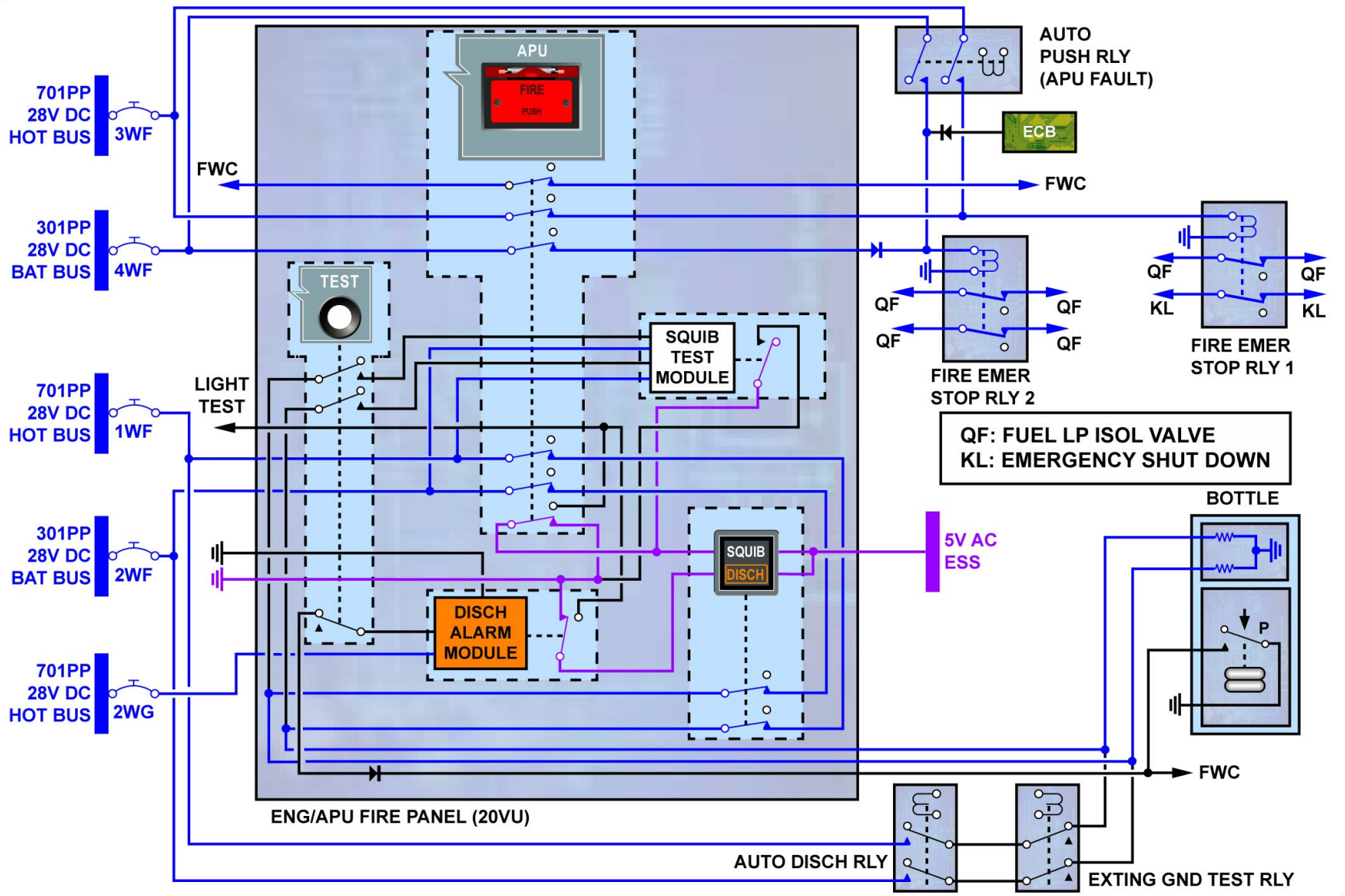
ELECTRICAL CIRCUITS (3)

EXTINGUISHING CIRCUIT (continued)

DISCH PUSHBUTTON

When the AGENT P/BSW is selected the extinguishing agent is released and flows into the APU compartment. The amber DISCH legend comes on when the fire extinguisher bottle has lost pressure.

UGB13131 - U7ST0M0 - UM26O5000000001



EXTINGUISHING CIRCUIT - DISCH PUSHBUTTON

UGB13131 - U7ST0M0 - UM26O5000000001

ELECTRICAL CIRCUITS (3)

AUTO EXTINGUISHING CIRCUIT

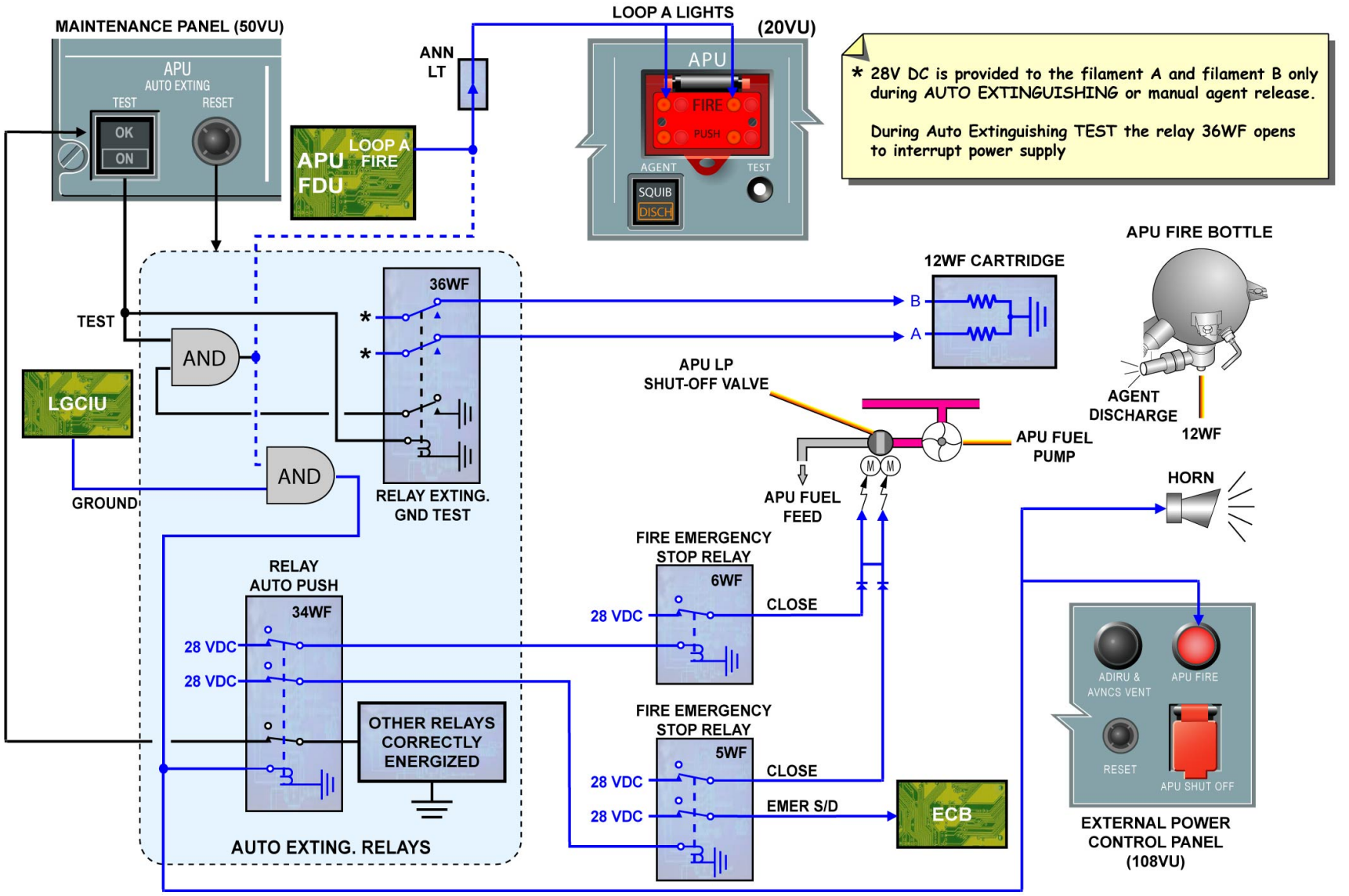
When an APU fire is detected on ground, the extinguishing system is automatically activated. The system circuit gets its power supply from the DC system of the aircraft.

FIRE DETECTED

In case of fire detected on the ground and input signal from LGCIU 1 (MLG 1+2 compressed) valid, 28 VDC is provided to several Relays inside the APU Auto Extinguishing Relay Circuit to initiate the EMER shut down and automatic fire extinguishing of the APU. The relay circuit energizes the ground horn and the APU FIRE light on the EXTernal PoWeR panel. The APU LP Valve Motors will be supplied with electrical power to close the Valve, the APU ECB receives a discrete input signal to initiate an EMER shut down and the APU fire bottle squib will be supplied with 28VDC 3sec. after EMER shut down has been initiated by the ECB.
The bottle is discharged and the extinguishing agent is released into the APU compartment.

NOTE: Note: APU automatic extinguishing is only triggered by APU Fire Loop "A".

UGB13131 - U7ST0M0 - UM26O5000000001



AUTO EXTINGUISHING CIRCUIT - FIRE DETECTED

UGB13131 - U7ST0M0 - UM26O5000000001

ELECTRICAL CIRCUITS (3)

AUTO EXTINGUISHING CIRCUIT (continued)

AUTO EXTINGUISHING TEST

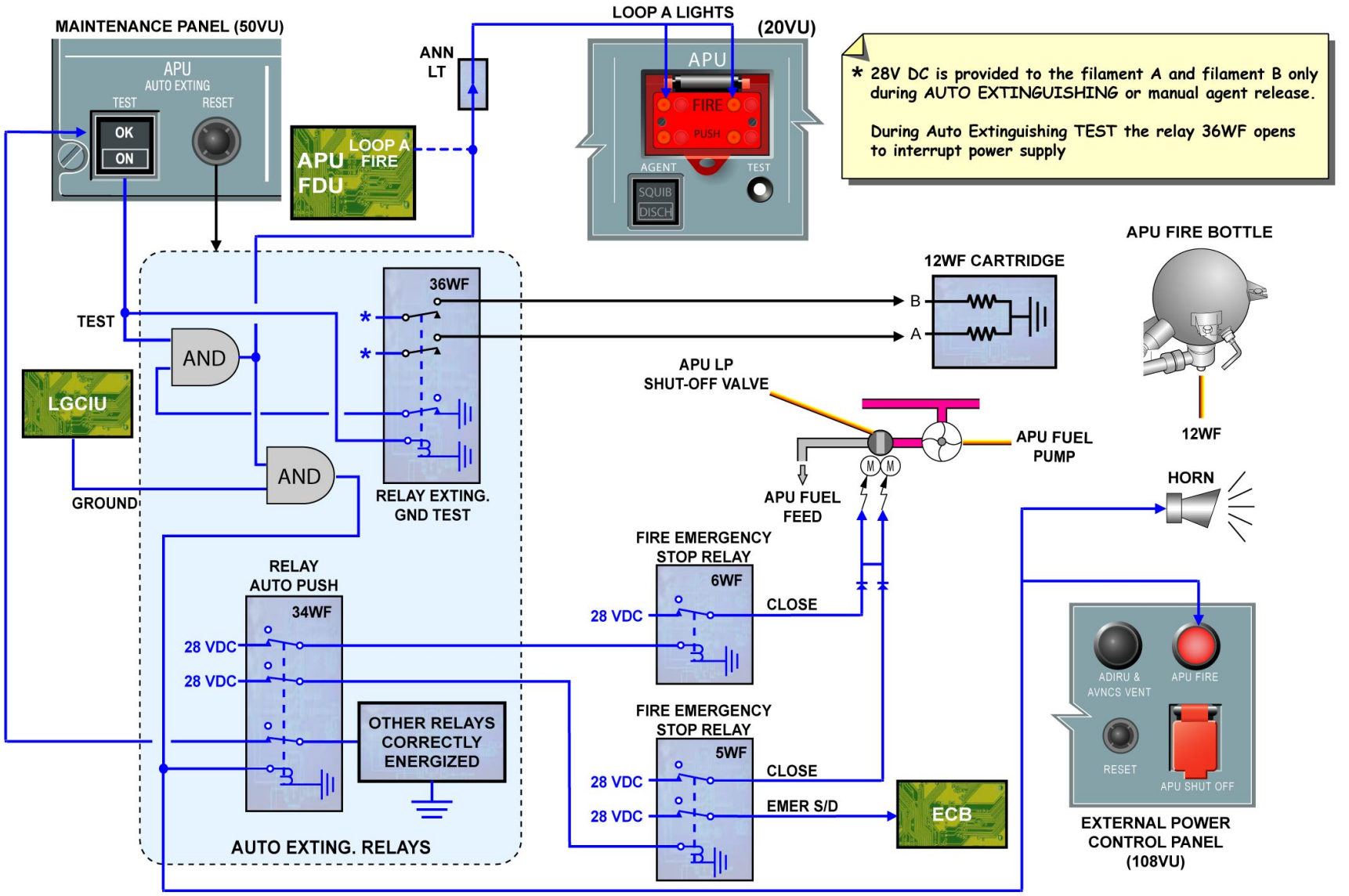
The test is initiated from the APU AUTO EXTINGuishing section of the overhead panel (50VU). Pressing the TEST P/BSW, the white ON light is illuminated and 28VDC is connected to a number of relays inside the Auto Extinguishing Relay Circuit, which then energize the:
- Extinguishing Ground Test Relay (36WF), to isolate the Fire Extinguishing Bottle from the automatic fire extinguishing circuit, to prevent 28VDC power supply to the filaments of Fire Extinguishing Bottle Cartridge, during the Test.

Once this Extinguishing Ground Test Relay is energized, the test continues as follows:
- The APU FIRE P/B Loop A lights illuminate.

With the A/C ON GROUND condition, supplied by LGCIU 1:
- The Relay Auto Push (34WF) controls the Fire EMER Stop Relay 1 (5WF) to initiate the closing of the APU Fuel LP Valve and the EMER Shut down signal to the ECB,
- The Relay Auto Push (34WF) also controls Fire EMER Stop Relay 2 (6WF), also responsible to initiate the closing of APU Fuel LP Valve,
- The RED APU FIRE light on the External Power panel 108VU illuminates,
- The Ground Horn sounds.

Finally the white OK indicator light on the Auto Extinguishing Test P/BSW comes on to indicate the correct operation of the tested Relays, indicating a successful circuitry test.

UGB13131 - U7ST0M0 - UM26O5000000001



AUTO EXTINGUISHING CIRCUIT - AUTO EXTINGUISHING TEST

UGB13131 - U7ST0M0 - UM26O5000000001

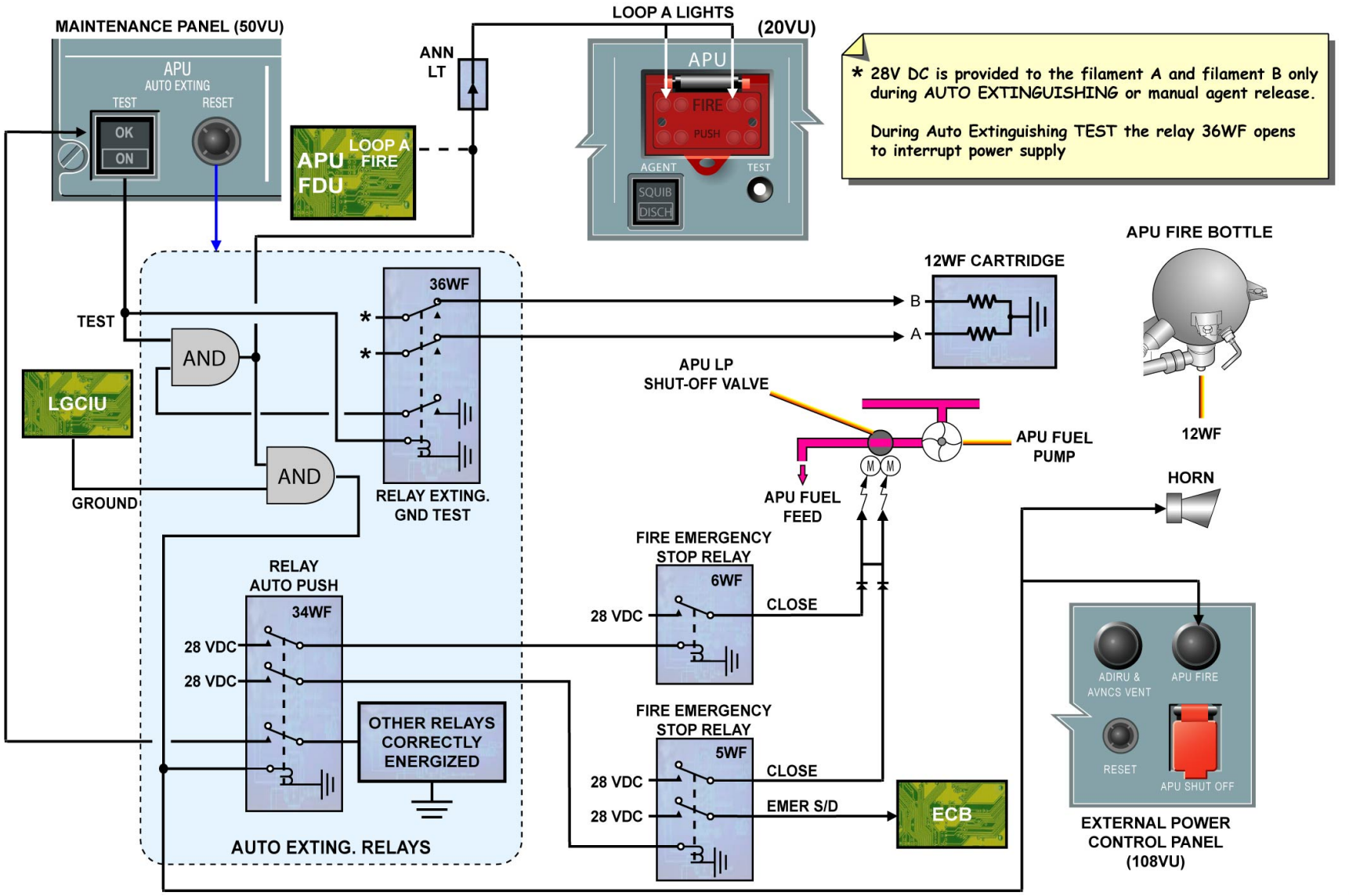
ELECTRICAL CIRCUITS (3)

AUTO EXTINGUISHING CIRCUIT (continued)

SYSTEM RESET

The reset is initiated from the APU AUTO EXTING section of the overhead panel. When the RESET P/BSW is pressed all the relays are de-energized. The fire bottle is connected to the automatic fire extinguishing circuit again. The horn and the APU FIRE light go off. The ON and OK indicator lights go off.

UGB13131 - U7ST0M0 - UM26O5000000001



AUTO EXTINGUISHING CIRCUIT - SYSTEM RESET

UGB13131 - U7ST0M0 - UM26O5000000001

AVIONICS SMOKE PROCEDURE (3)

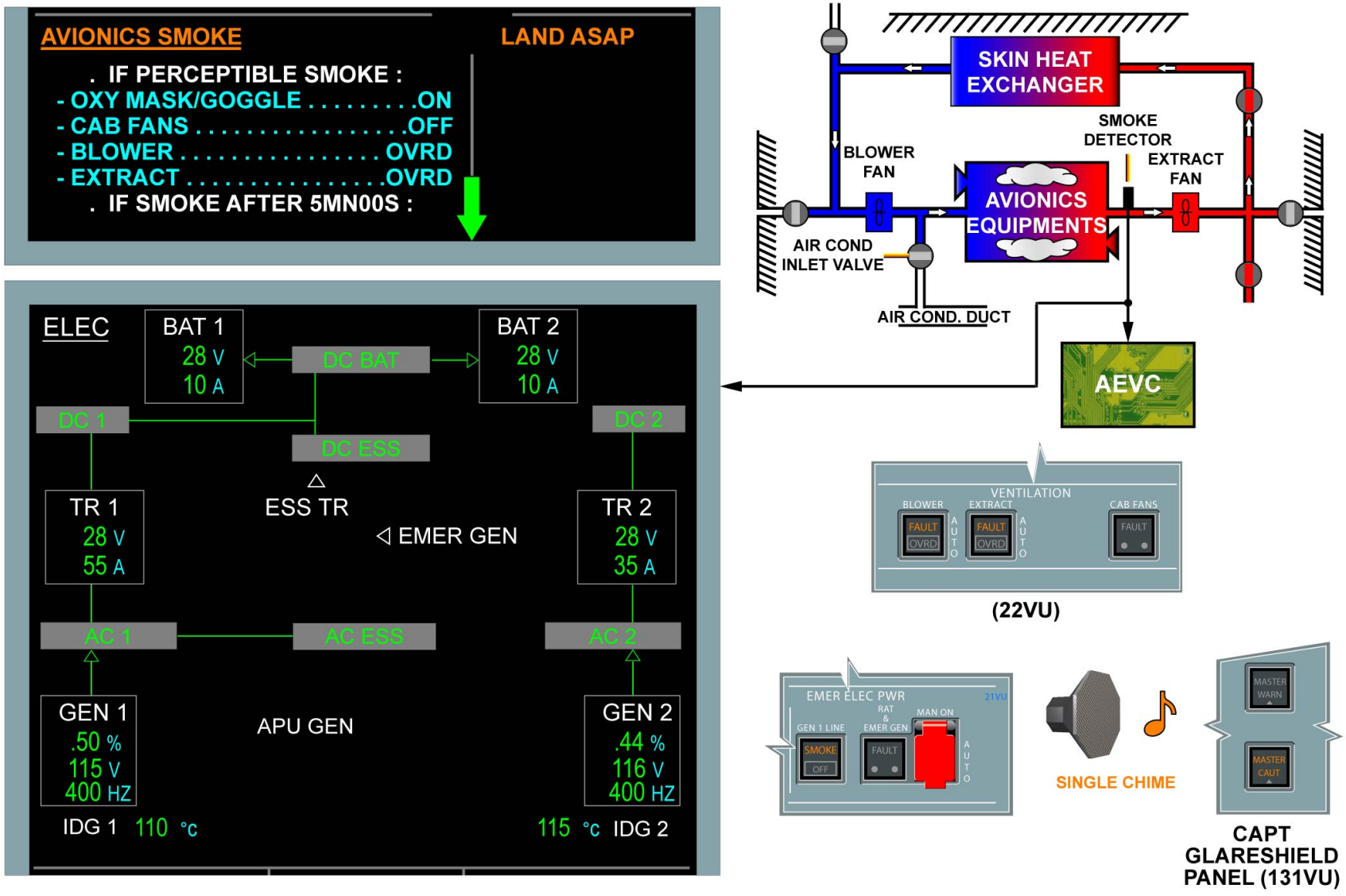
MASTER CAUTION

When smoke is detected, the MASTER CAUTion comes on, the Single Chime (SC) sounds, GENerator 1 LINE SMOKE light comes on, on the EMERgency ELECtrical PoWeR panel and the BLOWER FAULT and EXTRACT FAULT lights on the VENTILATION panel come on. The actions to do appear on the upper ECAM display.

NOTE: The smoke is directly perceptible by the crew through the center pedestal.

The MASTER CAUT must be selected before doing the ECAM actions.

UGB13131 - U7ST0M0 - UM26O7000000001

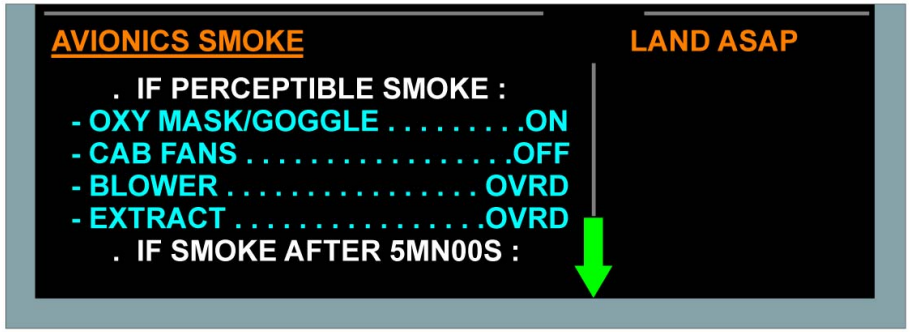


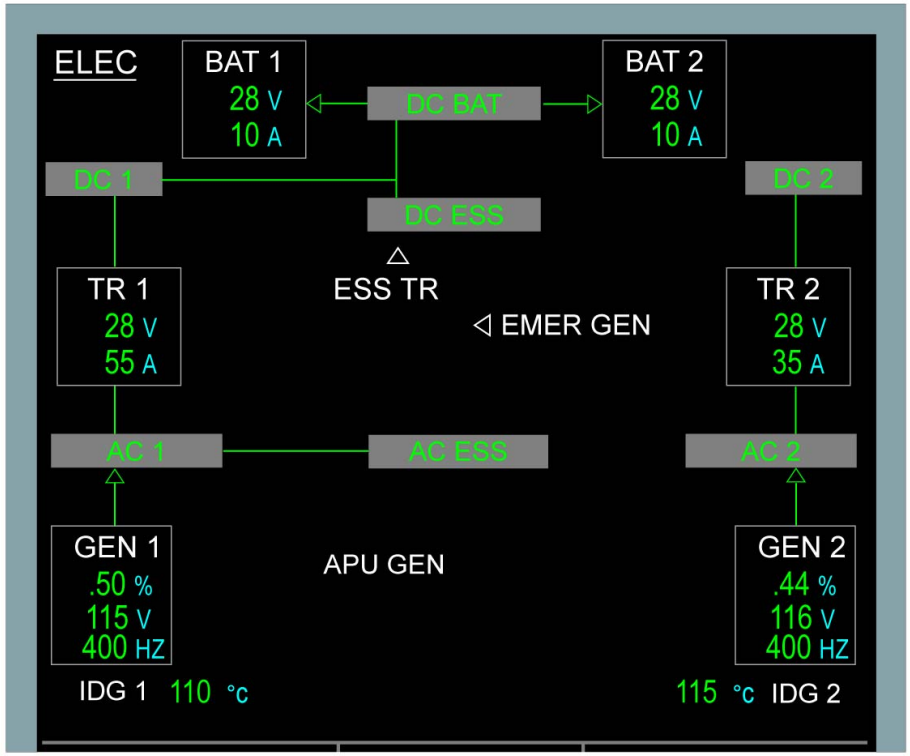
MASTER CAUTION

AVIONICS SMOKE PROCEDURE (3)

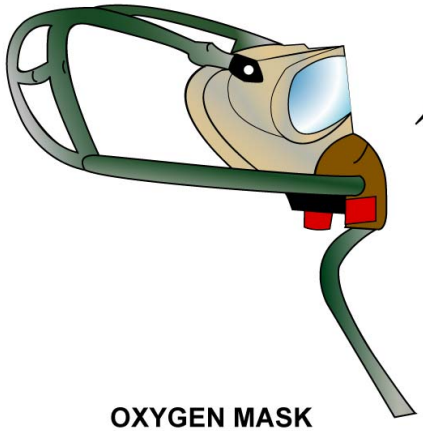
OXYGEN MASK

As smoke is confirmed, the crew has to use the oxygen masks and establish communication. Avoid the use of interphone position to minimize the interference from oxygen mask breathing noise.


AVIONICS SMOKE
LAND ASAP
. IF PERCEPTIBLE SMOKE :
- OXY MASK/GOGGLE . . . . . .ON
- CAB FANS . . . . . .OFF
- BLOWER . . . . . OVRD
- EXTRACT . . . . . .OVRD
. IF SMOKE AFTER 5MN00S :



OXYGEN MASK STOWAGE BOX



OXYGEN MASK

OXYGEN MASK

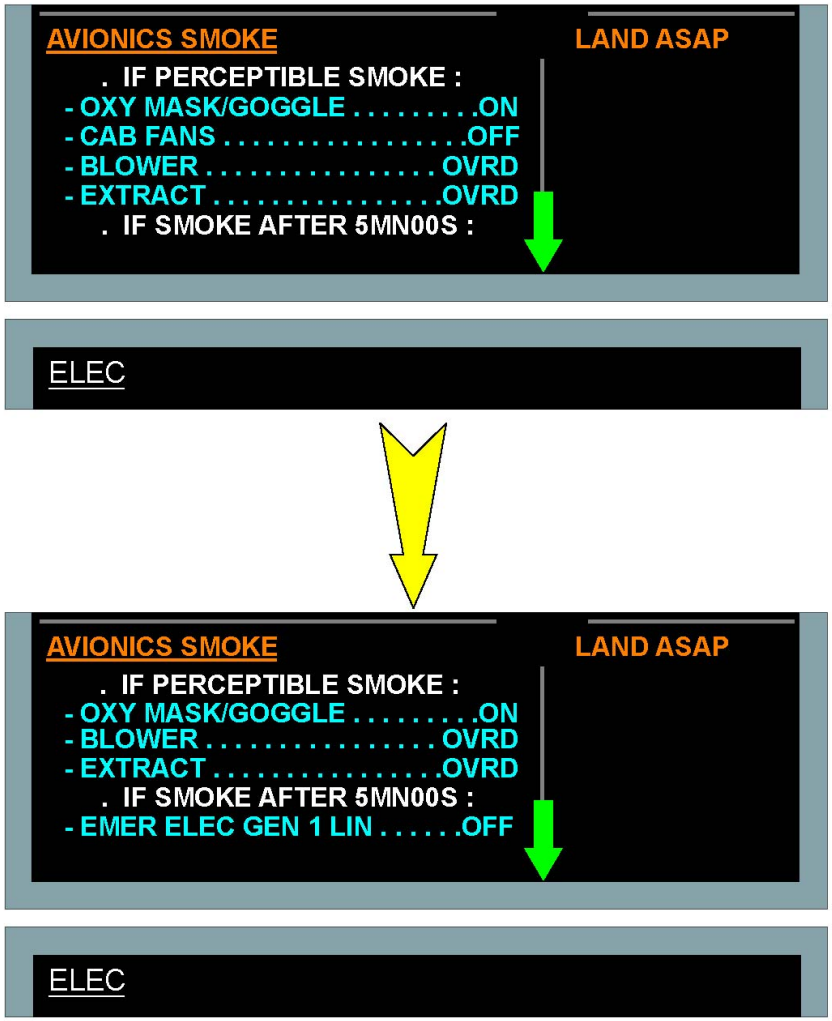
AVIONICS SMOKE PROCEDURE (3)

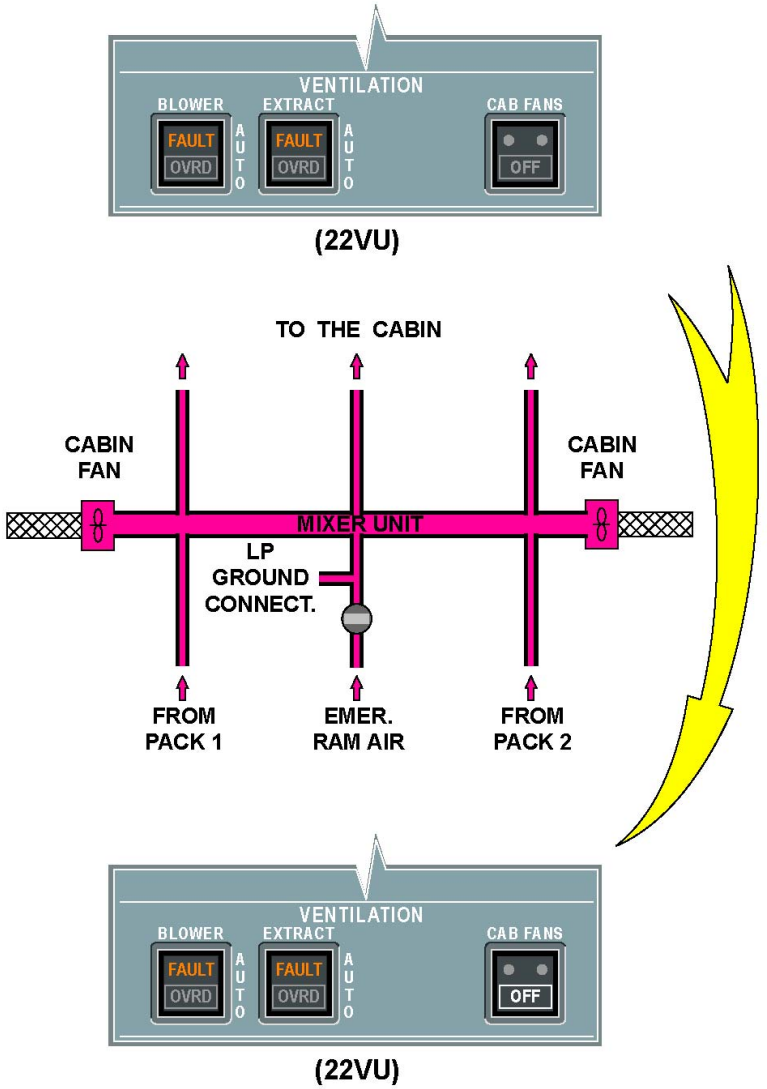
CABIN AND COCKPIT ISOLATION

CABIN FANS

To prevent smoke from entering into the cockpit and cabin, the cabin fans have to be stopped by setting to OFF the CABin FANS P/BSW on the VENTILATION panel.

UGB13131 - U7ST0M0 - UM26O7000000001


AVIONICS SMOKE
LAND ASAP
. IF PERCEPTIBLE SMOKE :
- OXY MASK/GOGGLE . . . . . .ON
- CAB FANS . . . . . .OFF
- BLOWER . . . . . OVRD
- EXTRACT . . . . . .OVRD
. IF SMOKE AFTER 5MN00S :
ELEC
AVIONICS SMOKE
LAND ASAP
. IF PERCEPTIBLE SMOKE :
- OXY MASK/GOGGLE . . . . . .ON
- BLOWER . . . . . OVRD
- EXTRACT . . . . . .OVRD
. IF SMOKE AFTER 5MN00S :
- EMER ELEC GEN 1 LIN . . . . . .OFF
ELEC



CABIN AND COCKPIT ISOLATION - CABIN FANS

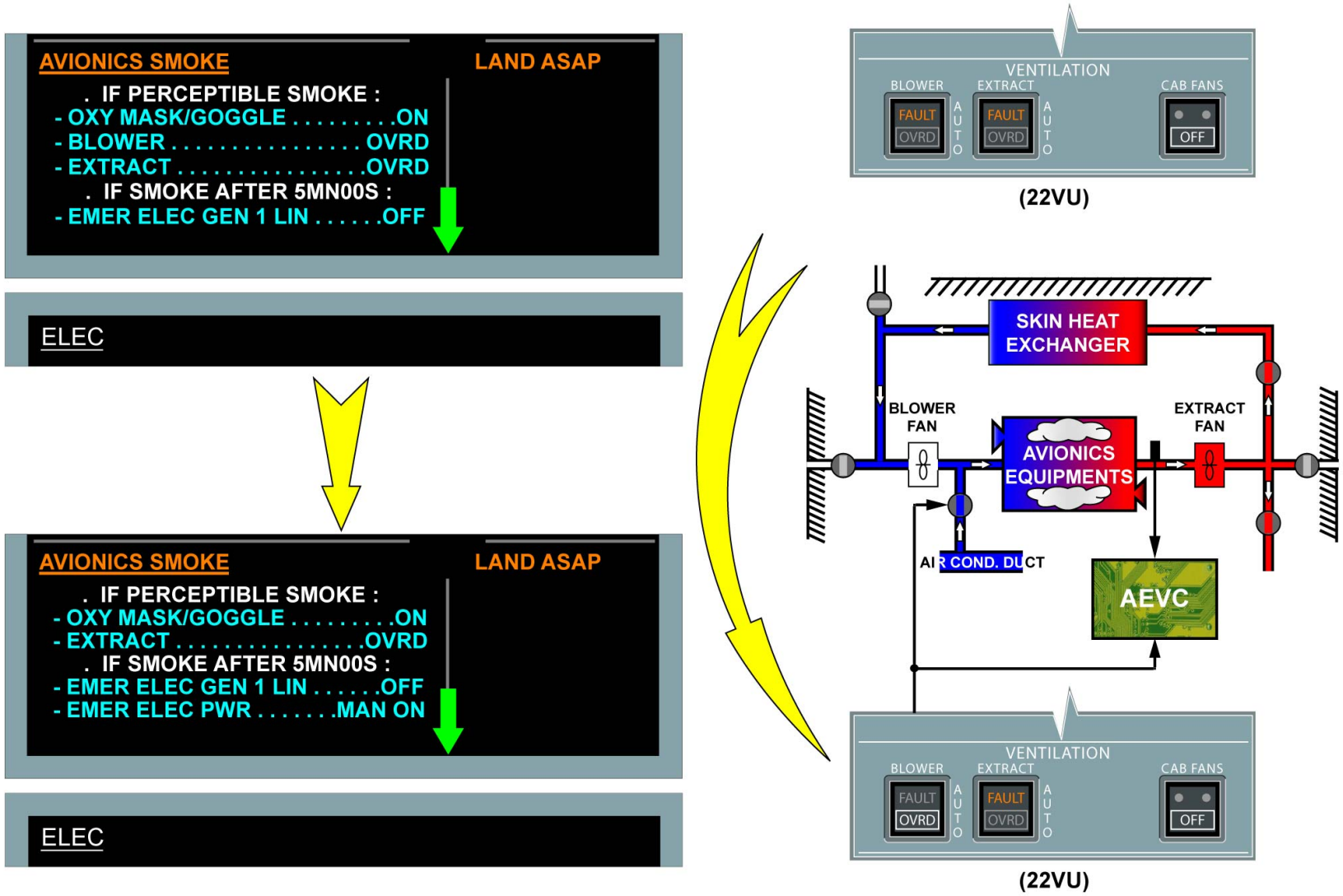
AVIONICS SMOKE PROCEDURE (3)

CABIN AND COCKPIT ISOLATION (continued)

BLOWER FAN

The blower and extract fans of the avionics ventilation system must be set to the OVeRriDe position to evacuate the smoke overboard. When the BLOWER P/BSW is set to OVRD, the blower fan stops and the air conditioning system is used as a cold air source by opening the air conditioning inlet valve.

UGB13131 - U7ST0M0 - UM26O7000000001



CABIN AND COCKPIT ISOLATION - BLOWER FAN

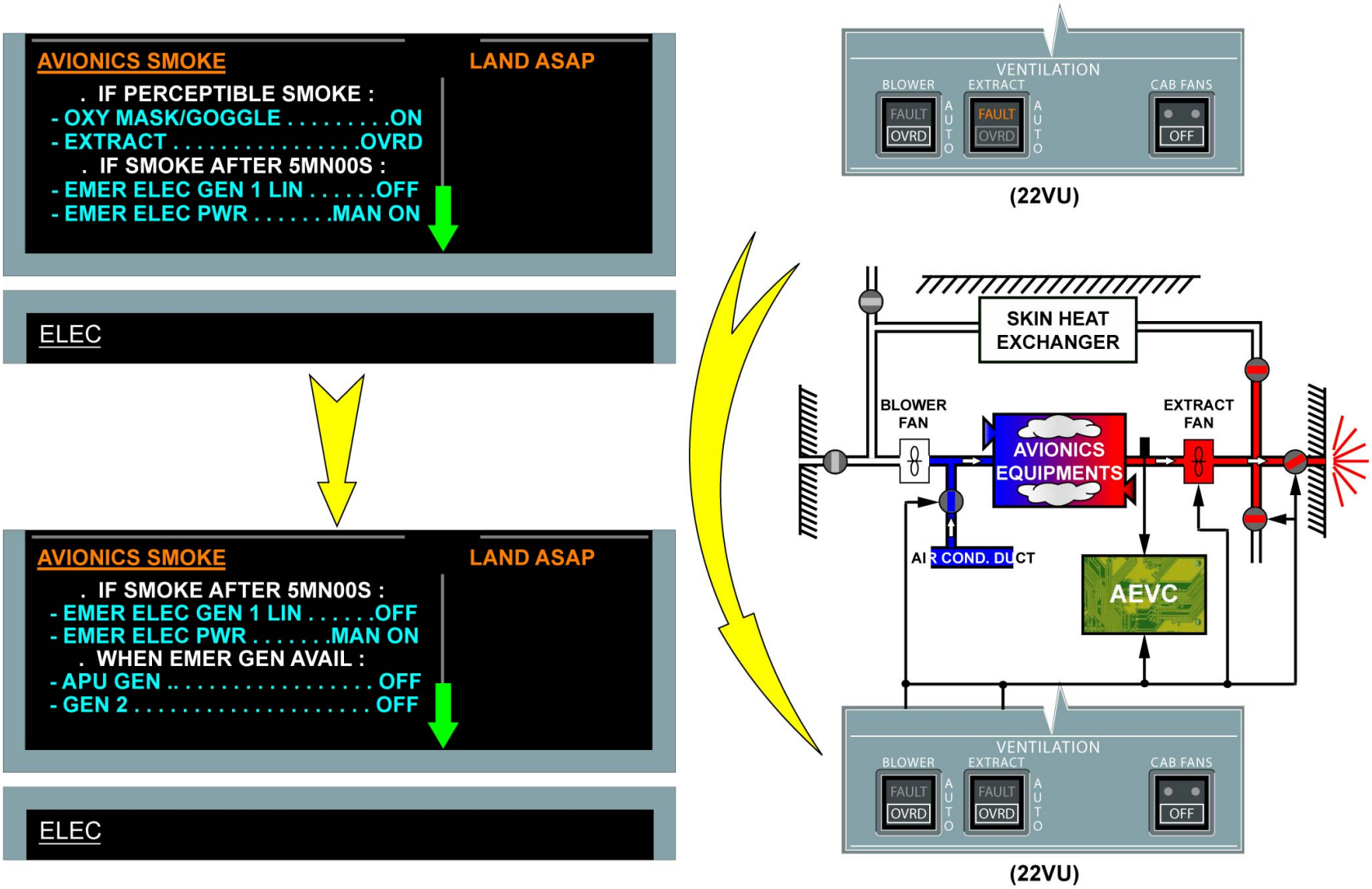
AVIONICS SMOKE PROCEDURE (3)

CABIN AND COCKPIT ISOLATION (continued)

EXTRACT FAN AND EXTRACT VALVE

The EXTRACT P/BSW must be set to OVRD position. Then, the air is extracted overboard through the auxiliary flap inside the Skin Air Outlet Valve, which is partially open. The extract fan keeps on running. When the SMOKE warning is displayed, a 5 minutes countdown is also displayed on ECAM. After the ventilation system reconfiguration, the cockpit crew should allow 5 minutes for the SMOKE warning to disappear.

UGB13131 - U7ST0M0 - UM26O7000000001



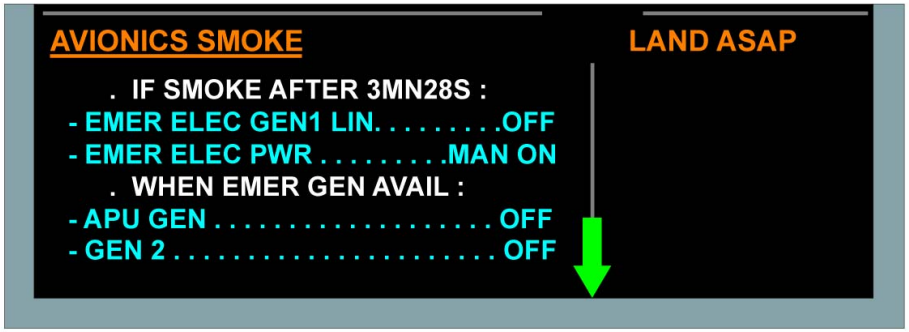
CABIN AND COCKPIT ISOLATION - EXTRACT FAN AND EXTRACT VALVE

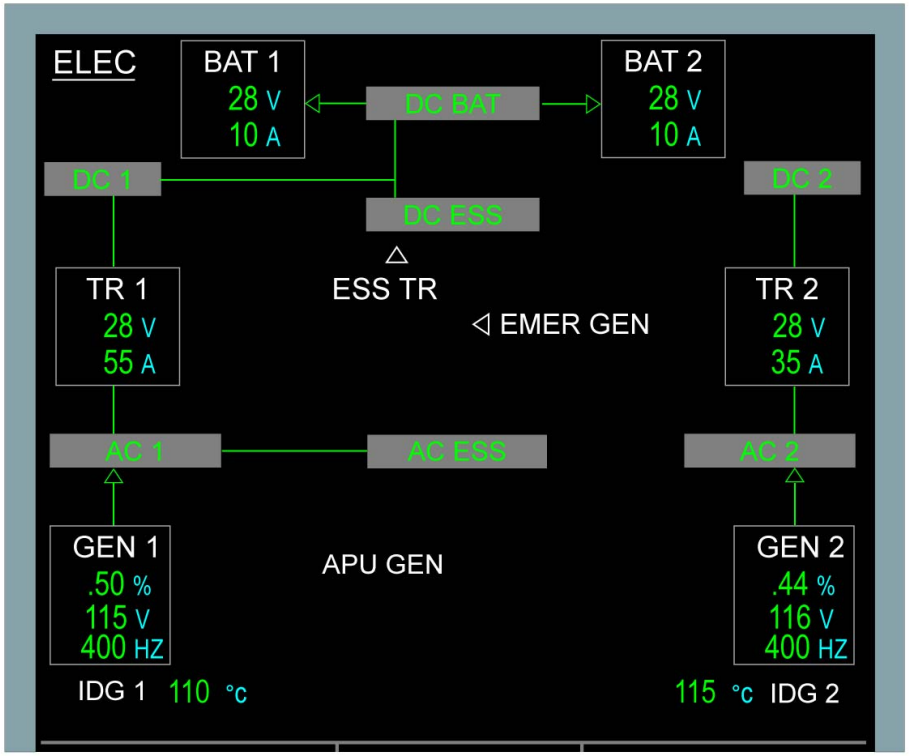
AVIONICS SMOKE PROCEDURE (3)

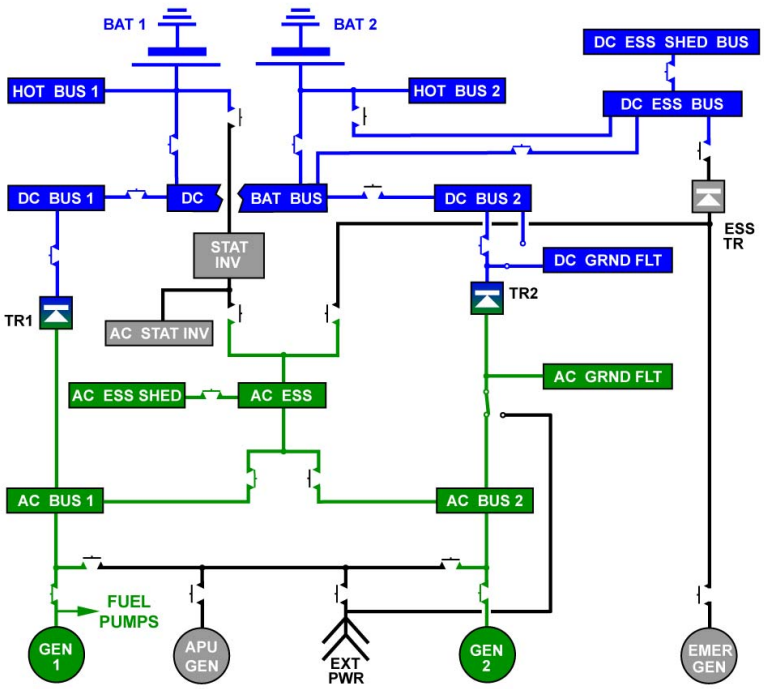
SMOKE SOURCE ISOLATION

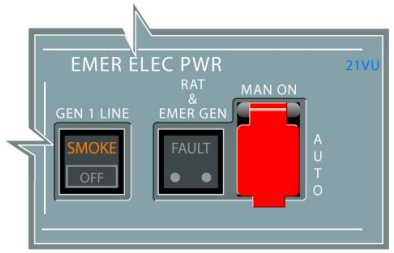
As smoke is still perceptible, it is necessary to act on the electrical system. The actions shown on the EWD indicate how to shed the normal electrical network to isolate the smoke source.

UGB13131 - U7ST0M0 - UM26O7000000001


AVIONICS SMOKE
LAND ASAP
. IF SMOKE AFTER 3MN28S :
- EMER ELEC GEN1 LIN. . . . . .OFF
- EMER ELEC PWR . . . . . .MAN ON
. WHEN EMER GEN AVAIL :
- APU GEN . . . . . OFF
- GEN 2 . . . . . OFF







SMOKE SOURCE ISOLATION

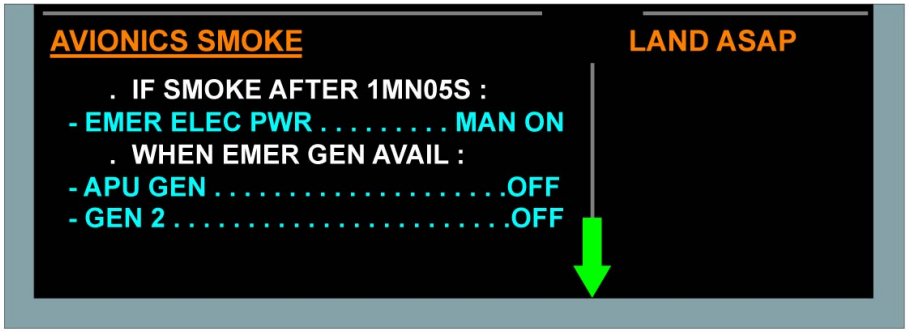
AVIONICS SMOKE PROCEDURE (3)

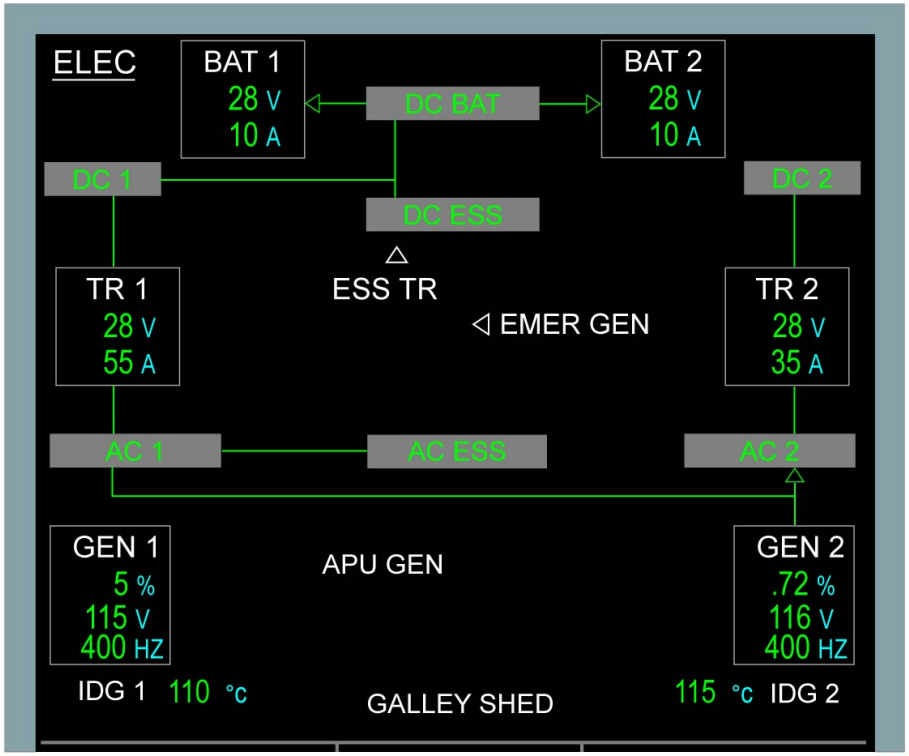
SMOKE SOURCE ISOLATION (continued)

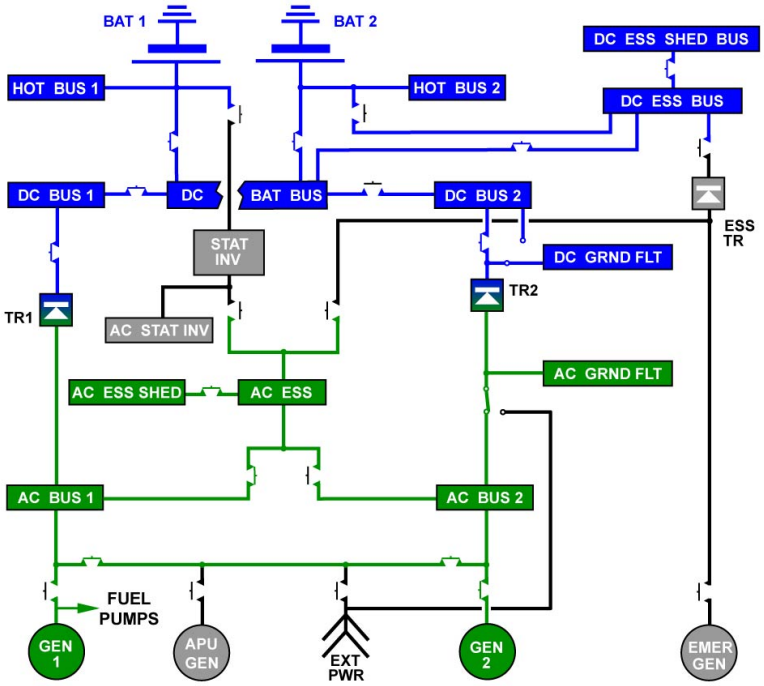
GENERATOR 1

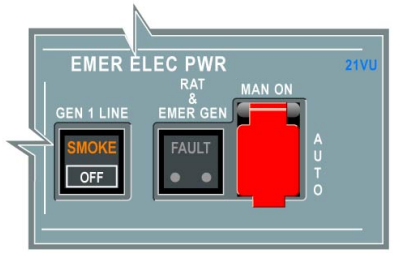
To isolate the smoke source the GEN 1 LINE P/BSW must be set to the OFF position. This opens the GEN 1 LINE contactor. Generator 1 keeps on supplying one fuel pump on each wing tank, and the galleys are shed. AC BUS 1 is supplied by generator 2 through the Bus Tie Contactor (BTC).

UGB13131 - U7ST0M0 - UM26O7000000001









SMOKE SOURCE ISOLATION - GENERATOR 1

AVIONICS SMOKE PROCEDURE (3)

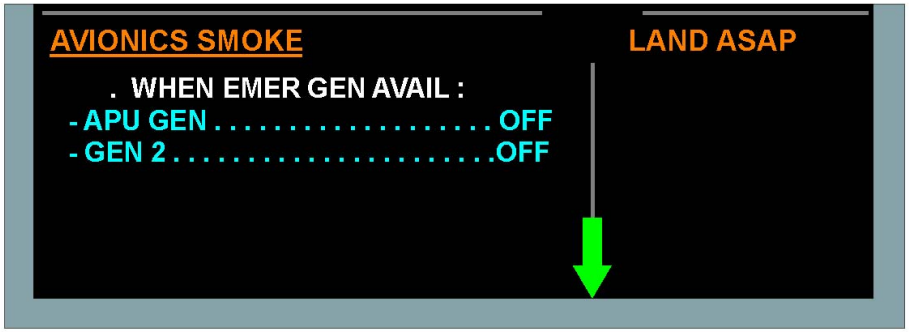
ESSENTIAL ELECTRICAL NETWORK

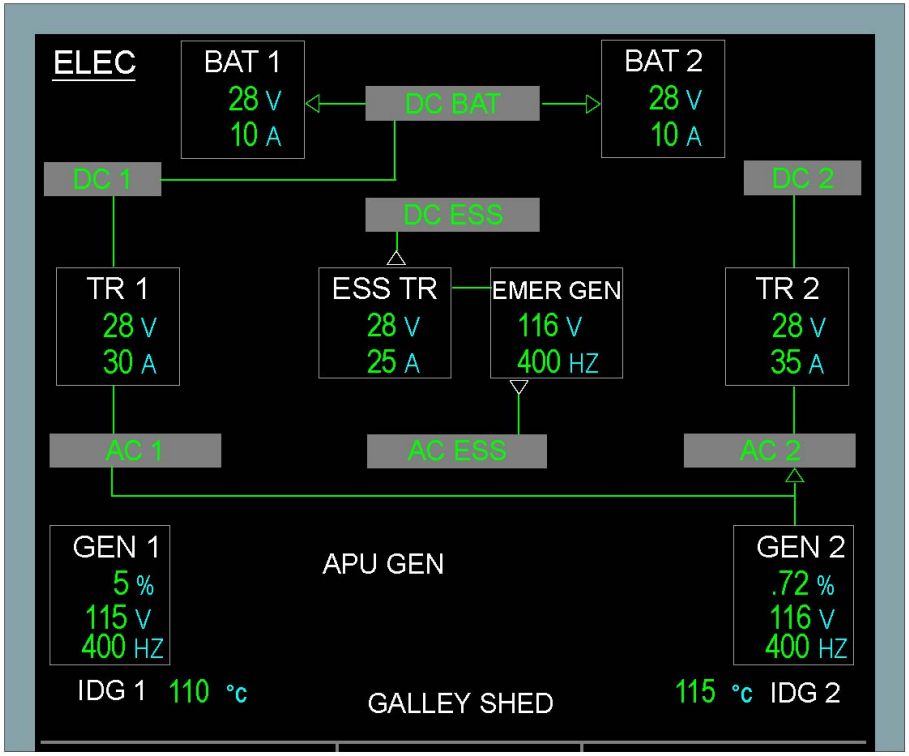
RAM AIR TURBINE SUPPLYING

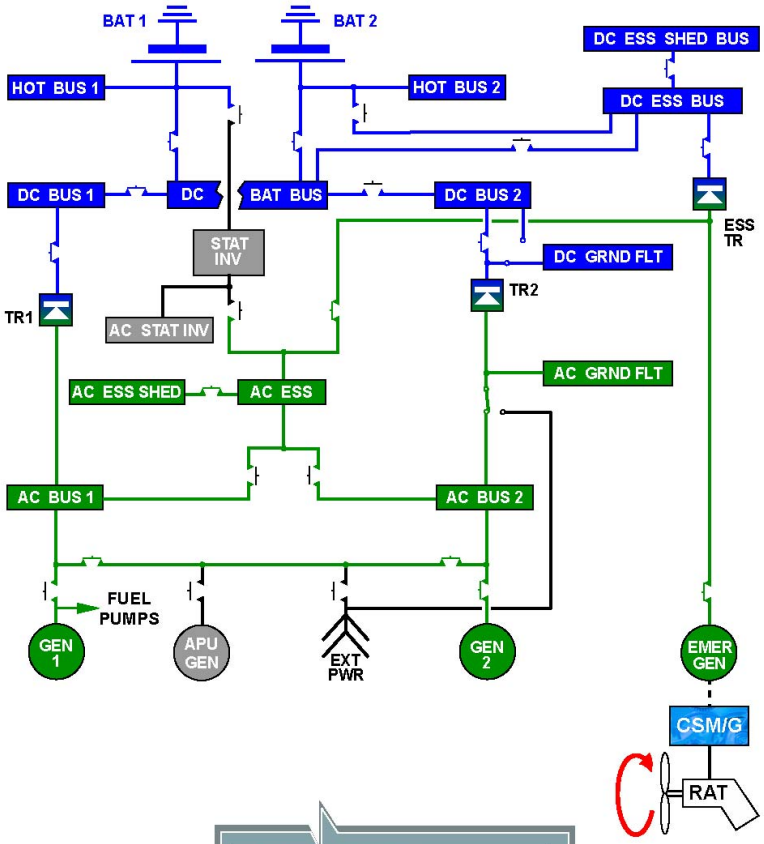
The MANual ON P/B must be selected to extend the Ram Air Turbine (RAT). The RAT is now extended and the EMER GEN is connected to keep the aircraft essential electrical network supplied.

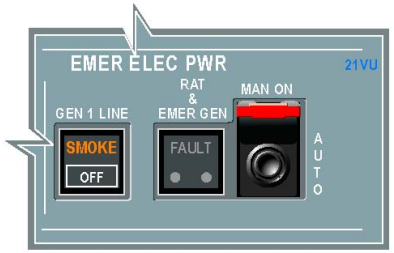
NOTE: The emergency generator parameters are displayed on the ECAM.

UGB13131 - U7ST0M0 - UM26O7000000001









ESSENTIAL ELECTRICAL NETWORK - RAM AIR TURBINE SUPPLYING

AVIONICS SMOKE PROCEDURE (3)

ESSENTIAL ELECTRICAL NETWORK (continued)

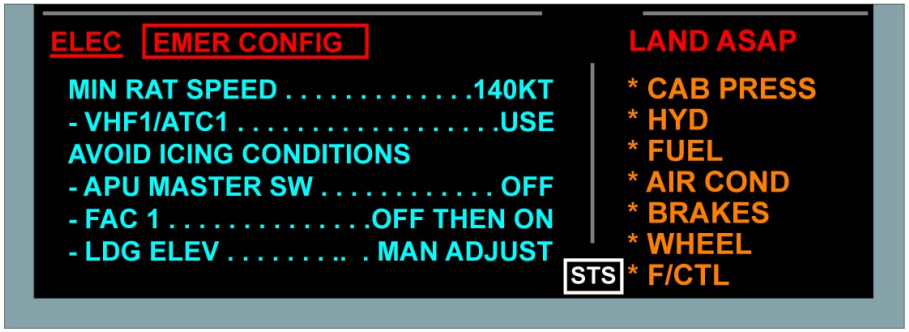
GENERATOR 2

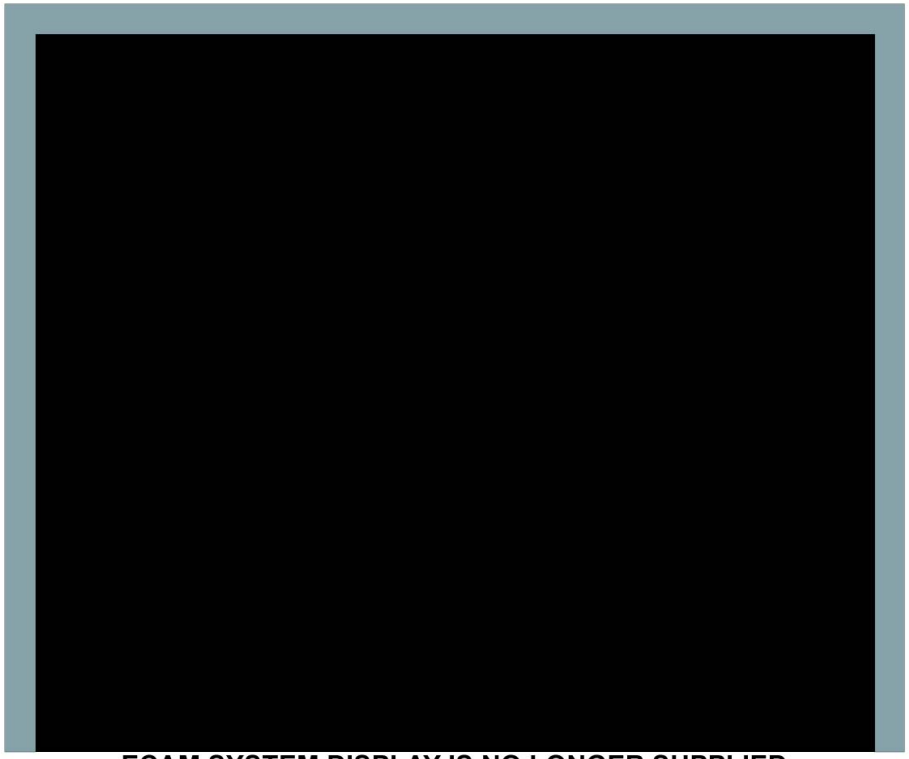
With the emergency generator running, the engine 2 and APU generators have to be switched off in order to isolate the normal electrical network. Engine 1 generator must be kept running for fuel pump operation.

EMERGENCY CONFIGURATION

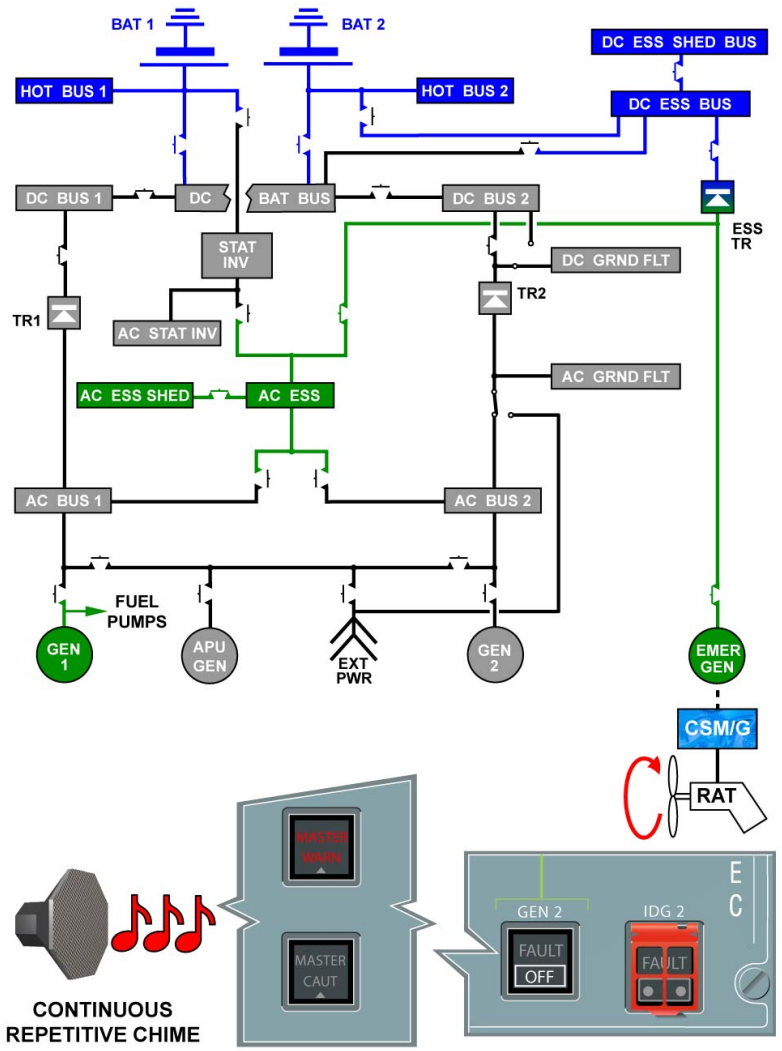
The GEN 2 P/BSW on the ELEC PWR panel is set to OFF. As both engine generators have been disconnected, the electrical system is now in emergency configuration and the lower ECAM display is no longer supplied. The aircraft has to land as soon as possible by following the emergency procedure. The avionics smoke procedure is then completed.

UGB13131 - U7ST0M0 - UM26O7000000001


ELEC
EMER CONFIG
MIN RAT SPEED 140KT
- VHF1/ATC1 . . . . . .USE
AVOID ICING CONDITIONS
- APU MASTER SW . . . . . OFF
- FAC 1 . . . . . .OFF THEN ON
- LDG ELEV . . . . MAN ADJUST
LAND ASAP
* CAB PRESS
* HYD
* FUEL
* AIR COND
* BRAKES
* WHEEL
STS
* F/CTL



ECAM SYSTEM DISPLAY IS NO LONGER SUPPLIED



ESSENTIAL ELECTRICAL NETWORK - GENERATOR 2 & EMERGENCY CONFIGURATION

CARGO FIRE PROTECTION SYSTEM PRESENTATION (2)

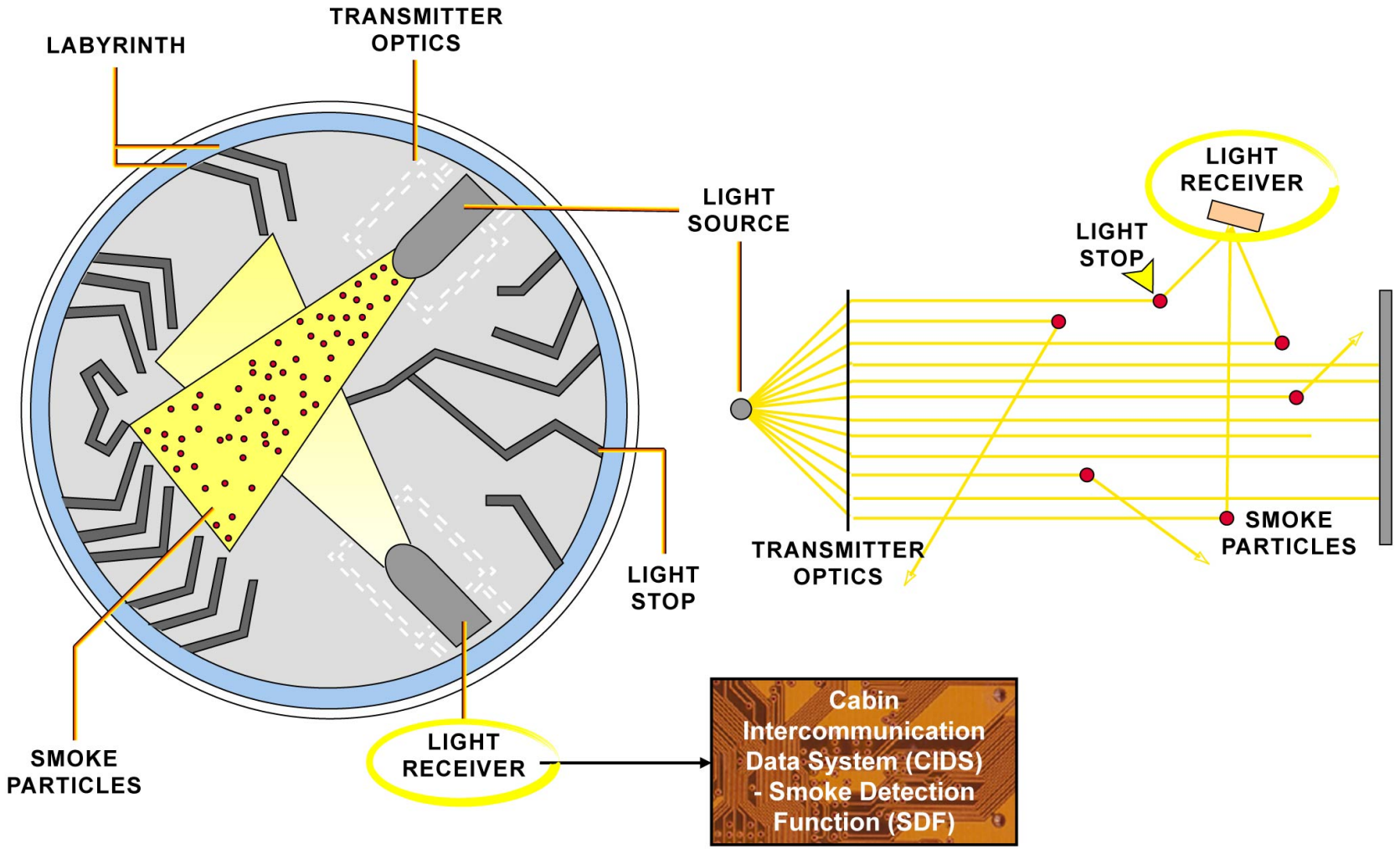
GENERAL

The cargo fire protection is supplied by two systems:
- the cargo smoke detection (separate FWD & AFT systems),
- the cargo fire extinguishing (separate FWD & AFT systems).

SMOKE DETECTORS

The cargo smoke detection system is installed in the FWD and in the AFT/BULK cargo compartments. Four optical smoke detectors are located in two cavities in the ceiling of the AFT/BULK cargo compartment and two additional detectors in the FWD cargo compartment. The cargo smoke detectors are electrically connected to the Cabin Intercommunication Data System (CIDS) directors via Controller Area Network (CAN) buses.

UGB13131 - U7ST0M0 - UM26P1000000002



GENERAL & SMOKE DETECTORS

CARGO FIRE PROTECTION SYSTEM PRESENTATION (2)

CIDS SMOKE DETECTION FUNCTION

For each compartment, the Smoke Detection Function (SDF) integrated in each CIDS director triggers cabin and cockpit warnings. The directors interface with the Centralized Fault Display Interface Unit (CFDIU), the ventilation system, and the cargo fire extinguishing bottle condition monitoring system. A SMOKE warning is generated when both detectors in a cavity detect smoke ('AND' logic). The CIDS-SDF also monitors the smoke detectors in case of a single detection. When only one cargo smoke detector detects smoke, the CIDS-SDF checks the second detector automatically:
- if this test shows a normal operation of the second detector, the first detector is declared faulty. The result is no smoke warning in the cockpit,
- if this test shows an abnormal operation of the second detector, the smoke warnings are activated. The second detector is declared faulty.

WARNINGS

The CIDS-SDF sends signals for cockpit local warnings, ECAM system and cargo ventilation controller. It also supplies the fault messages to the Centralized Fault Display System (CFDS). In case of FWD or AFT/BULK smoke detection; the respective SMOKE light comes on, on the CARGO SMOKE panel. At the same time the cargo ventilation controller closes the isolation valves of the affected compartment (If ventilation installed). In case of a smoke detector failure, the CIDS-SDF sends signals to the ECAM and CFDS systems.

DISCH PUSHBUTTON

Action on one of the FWD or AFT guarded DISCHarge P/Bs discharges the bottle in the respective cargo compartment. When smoke is detected, the FWD or AFT DISCH P/BSW has to be pressed, in order to fire the related squib of the extinguishing bottle. Both DISCH lights come on when the fire extinguishing bottle is discharged.

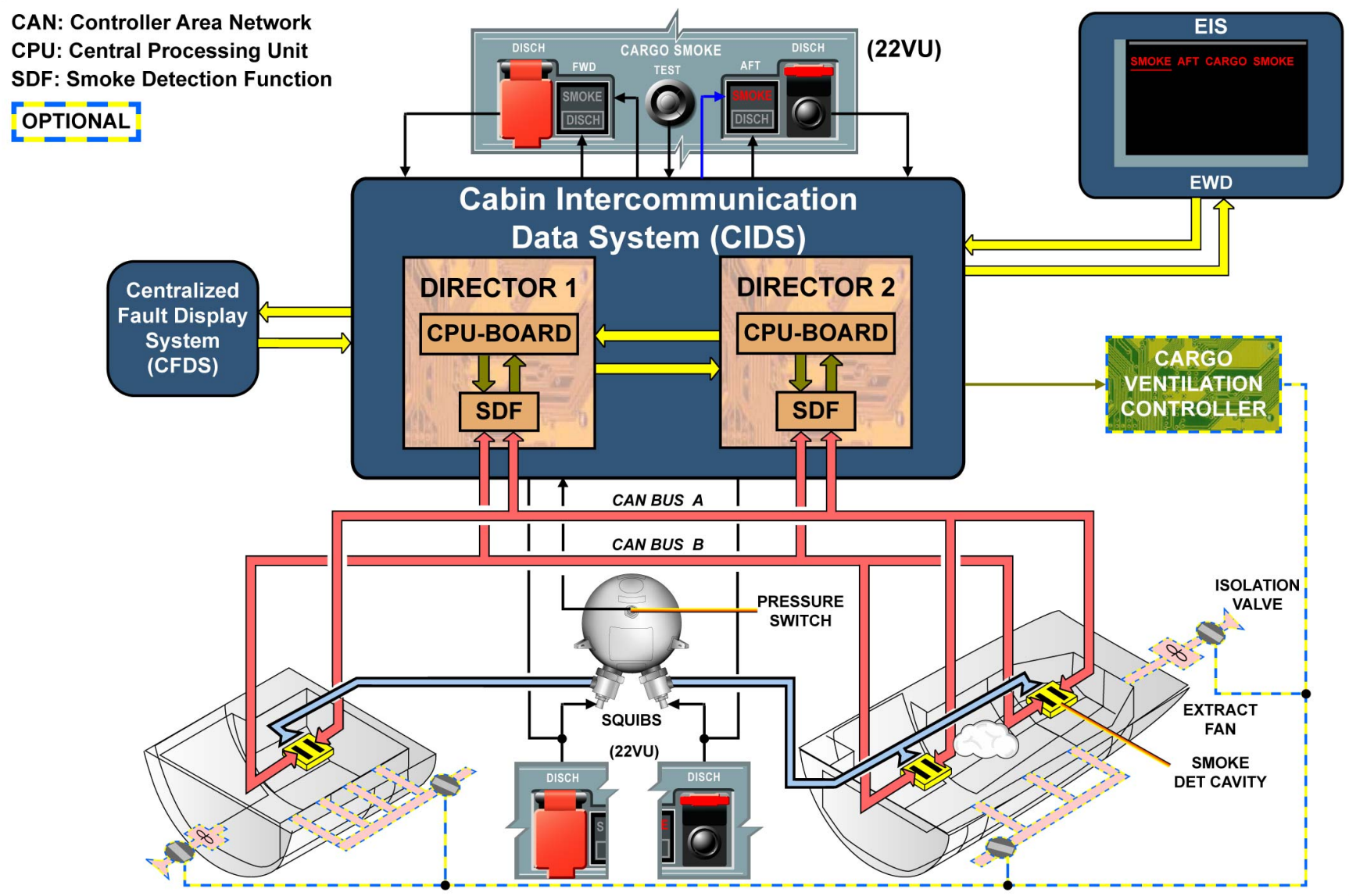
BOTTLE

On A320 and A321, one extinguisher bottle is installed in the FWD cargo compartment, on A318 and A319 the bottle is installed in the Bulk cargo compartment. Optionally, on the A320, the extinguisher bottle can be installed in the AFT cargo compartment. The bottle supplies fire extinguishing for the FWD and for the AFT/BULK cargo compartments. The bottle has a pressure switch to monitor agent pressure and two electrically firing cartridges or squibs for agent discharges. The bottle pressure and the two squibs circuit conditions are continuously monitored by the CIDS-SDF. In case of bottle pressure drop or loss of electrical squib continuity, the CIDS-SDF sends signals to the ECAM and CFDS.

TEST PUSHBUTTON

When the TEST P/B is pressed and held, the CIDS-SDF carries out an automatic test. Smoke and a bottle pressure drop conditions are simulated. The smoke detectors are tested. When the TEST P/B is pressed and held, the SMOKE and DISCH lights on the CARGO SMOKE panel come on twice, and the ECAM warnings are activated. The isolation valves of the cargo compartment ventilation system close and the extraction fan stops. The CIDS also passes the test and in case of a failure of one CIDS-SDF channel the lamps come on only once. When the TEST P/B is released, the DISCH lights and the SMOKE lights go off. The isolation valves of the cargo compartment ventilation system open and the extraction fan starts. The information is stored in the CFDS.

UGB13131 - U7ST0M0 - UM26P1000000002



CIDS SMOKE DETECTION FUNCTION ... TEST PUSHBUTTON

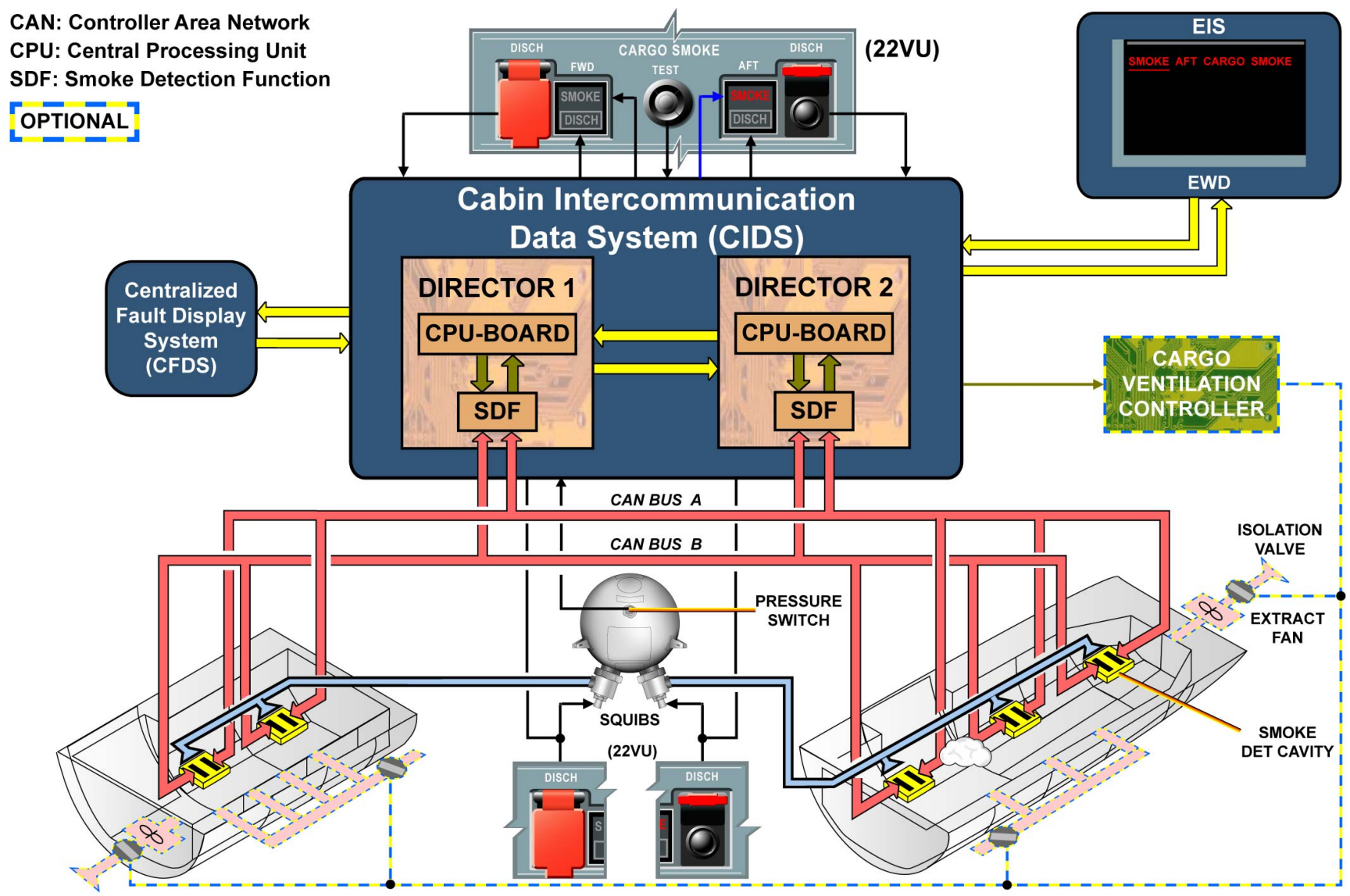
CARGO FIRE PROTECTION SYSTEM PRESENTATION (2)

A321 SYSTEM

The A321 cargo fire protection is supplied by two basic systems:
- the cargo smoke detection,
- the cargo fire extinguishing.

The A321 cargo fire protection system operation is identical to the A320.
The A321 cargo smoke detection system is installed in the FWD and in the AFT/BULK cargo compartments. Six optical smoke detectors are located in three cavities in the ceiling of the AFT/BULK cargo compartment and four additional detectors are located in two cavities in the ceiling of the FWD cargo compartment. The cargo smoke detectors are electrically connected to the CIDS directors via CAN busses.

UGB13131 - U7ST0M0 - UM26P1000000002


CAN: Controller Area Network
CPU: Central Processing Unit
SDF: Smoke Detection Function
OPTIONAL
DISCH
CARGO SMOKE
FWD
TEST
AFT
DISCH
SMOKE
DISCH
SMOKE
DISCH
(22VU)
EIS
SMOKE AFT CARGO SMOKE
EWD
Cabin Intercommunication Data System (CIDS)
DIRECTOR 1
CPU-BOARD
SDF
DIRECTOR 2
CPU-BOARD
SDF
Centralized Fault Display System (CFDS)
CARGO VENTILATION CONTROLLER
CAN BUS A
CAN BUS B
ISOLATION VALVE
EXTRACT FAN
PRESSURE SWITCH
SQUIBS
(22VU)
DISCH
DISCH
SMOKE DET CAVITY

A321 SYSTEM

CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

GENERAL

The cargo and lavatory smoke detectors are connected to both Smoke Detection Functions (SDFs) integrated in the Cabin Intercommunication Data System (CIDS) directors via Controller Area Network (CAN) busses.

LAVATORY SMOKE

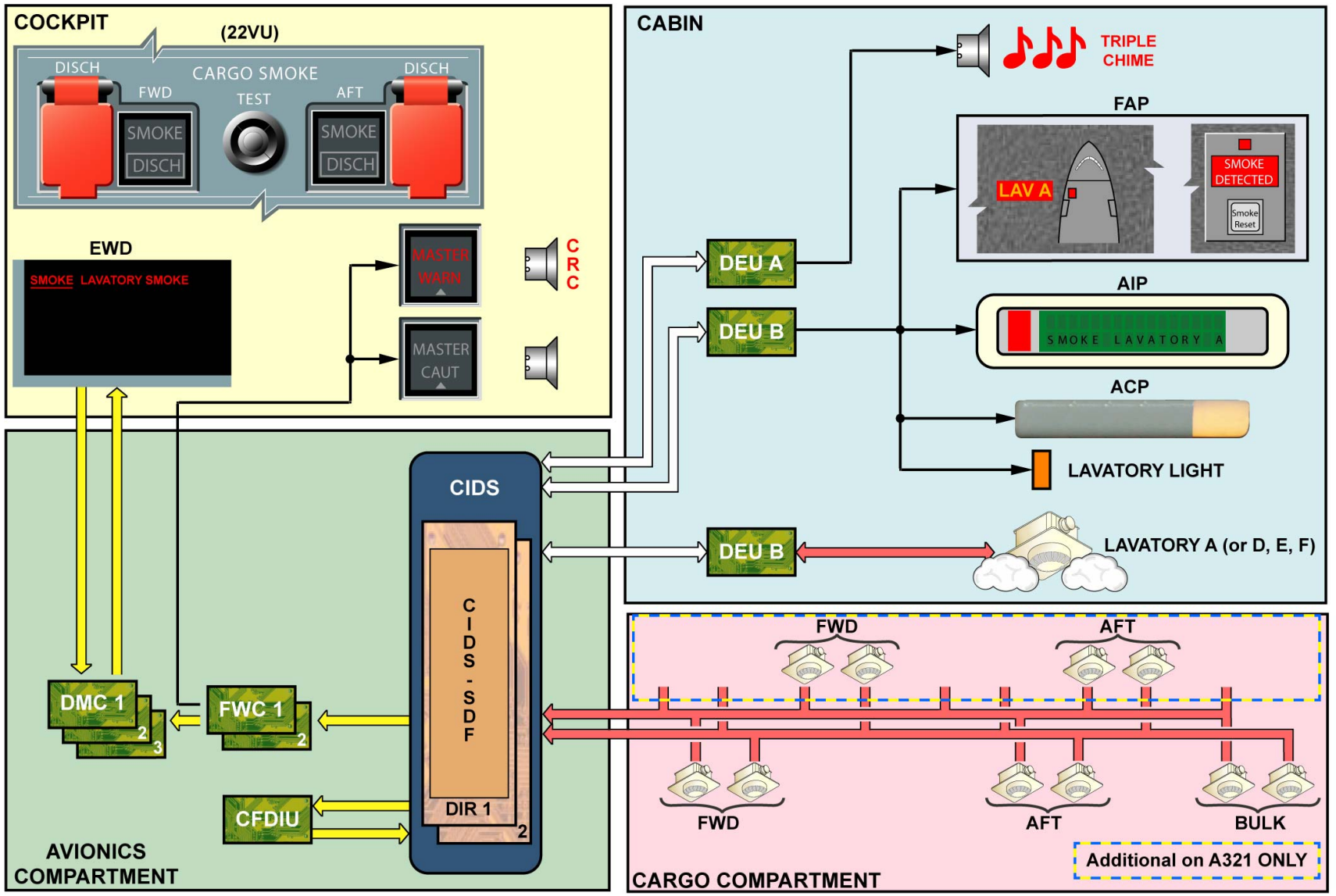
The lavatory smoke detectors are connected to type B Decoder/Encoder Units (DEUs) via CAN buses and the DEUs B are linked to the CIDS directors via the CIDS middle line bus. The lavatory smoke detection is done by the Central Processing Unit (CPU) and the CIDS-SDF. When smoke is detected in a lavatory, the CPU 1 or 2 sends the following cabin warnings:
- a triple chime is broadcast in all cabin or attendant station loudspeakers,
- a flashing amber light on the related Area Call Panel (ACP),
- "SMOKE LAV X" message is displayed and a red indicator flashes on all the Attendant Indication Panels (AIPs),
- SMOKE DETECTION page appears automatically on the Flight Attendant Panel (FAP) on which "SMOKE DETECTED" red message is displayed and a red icon is displayed at the affected location,
- the affected amber lavatory call light flashes.

Simultaneously, the SDF 1 or 2 sends a smoke alert to the Flight Warning Computers (FWCs), which generates the following cockpit warnings:
- a Continuous Repetitive Chime (CRC),
- the red MASTER WARNing light,
- the LAVATORY SMOKE warning message on the EWD.

If smoke is no longer detected, the directors automatically reset all visual and aural indications.

NOTE: An option disables lavatory warnings in the cockpit.

UGB13131 - U7ST0M0 - UM26D900000002



GENERAL & LAVATORY SMOKE

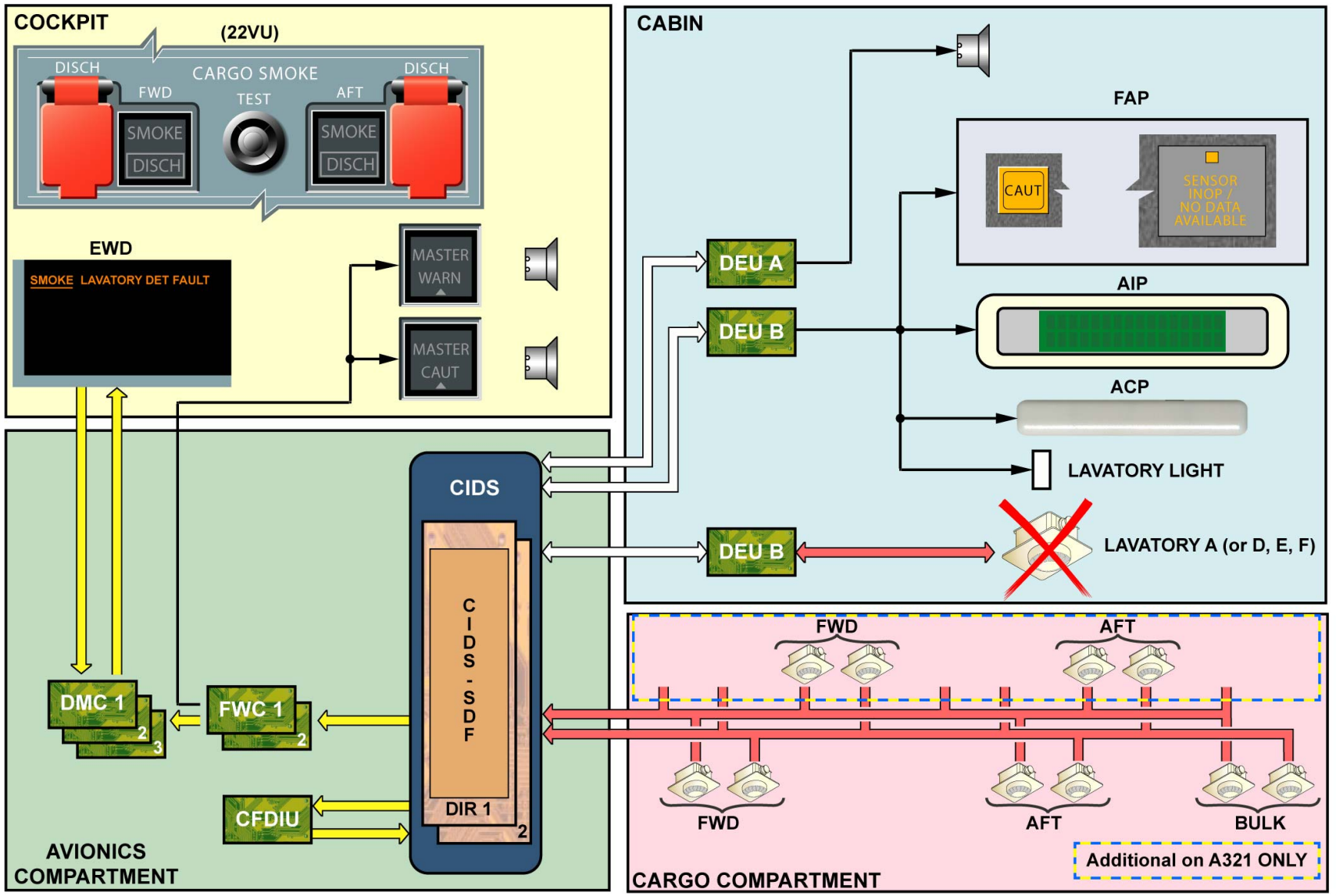
CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

LAVATORY FAULT

When a lavatory smoke detector failure is detected by CIDS-SDF, the faulty detector is automatically isolated in the bus system. The lavatory detection fault is shown in the cockpit and on the FAP for the cabin. The cabin warnings are:
- a flashing amber CAUTion light on FAP upper left corner if the SMOKE DETECTION page cannot be immediately displayed,
- an amber icon displayed at the affected location on the SMOKE DETECTION page,
- a failure message displayed in amber.

The inoperative lavatory smoke detector FAULT is sent to:
- the Centralized Fault Display Interface Unit (CFDIU) for maintenance purposes,
- the FWC, for ECAM indication,
- the CIDS directors for FAP indications.

UGB13131 - U7ST0M0 - UM26D900000002

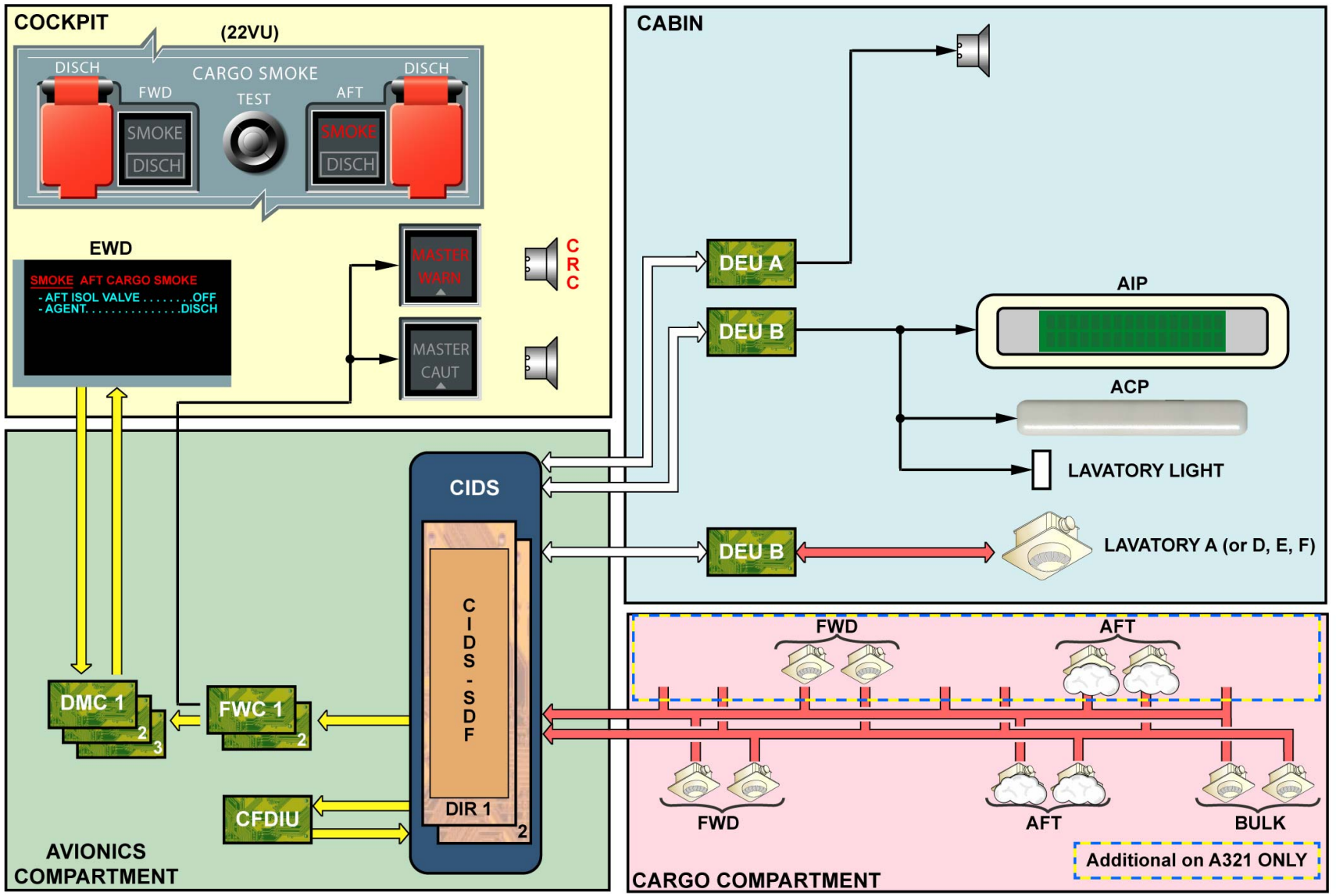


LAVATORY FAULT

CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

CARGO SMOKE

When cargo smoke is detected, the CIDS-SDF function sends the SMOKE warning signal to the cockpit through the FWCs. When smoke is detected in one compartment, (aft shown as example), the following activated warnings are:
- the CRC,
- the MASTER WARN light,
- the ECAM message,
- the SMOKE light on the CARGO SMOKE panel.


COCKPIT
(22VU)
DISCH
CARGO SMOKE
DISCH
FWD
TEST
AFT
SMOKE
DISCH
SMOKE
DISCH
EWD
SMOKE AFT CARGO SMOKE
- AFT ISOL VALVE . . . . . .OFF
- AGENT. . . . . .DISCH
MASTER WARN
MASTER CAUT
C R C
CABIN
DEU A
DEU B
AIP
ACP
LAVATORY LIGHT
DEU B
LAVATORY A (or D, E, F)
CIDS
C I D S - S D F
DIR 1
2
DMC 1
2
3
FWC 1
2
CFDIU
AVIONICS COMPARTMENT
FWD
AFT
FWD
AFT
BULK
Additional on A321 ONLY
CARGO COMPARTMENT

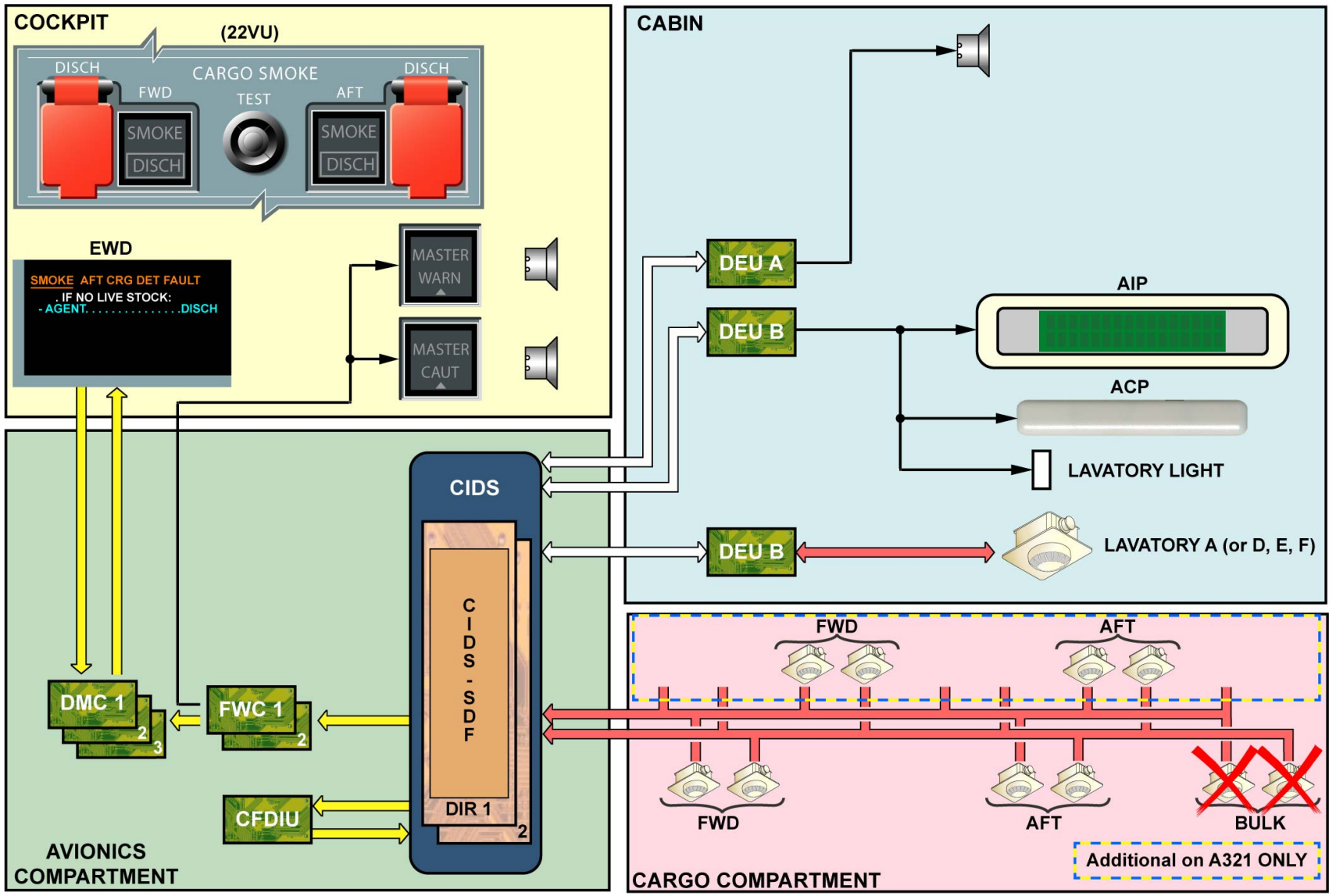
CARGO SMOKE

CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

CARGO FAULT

When a cargo smoke detector failure is detected by the CIDS-SDF, the faulty detector is automatically isolated in the bus system. The cargo detection fault is shown in the cockpit. The inoperative cargo smoke detector (bulk shown as example) FAULT is sent to:
- the CFDIU for maintenance purposes,
- the FWCs, for ECAM indication.

UGB13131 - U7ST0M0 - UM26D900000002


COCKPIT
(22VU)
DISCH
CARGO SMOKE
DISCH
FWD
TEST
AFT
SMOKE
DISCH
SMOKE
DISCH
EWD
SMOKE AFT CRG DET FAULT
. IF NO LIVE STOCK:
- AGENT. . . . . .DISCH
MASTER WARN
MASTER CAUT
CABIN
DEU A
DEU B
AIP
ACP
LAVATORY LIGHT
DEU B
LAVATORY A (or D, E, F)
CIDS
C I D S - S D F
DIR 1
2
DMC 1
2
3
FWC 1
2
CFDIU
AVIONICS COMPARTMENT
FWD
AFT
FWD
AFT
BULK
Additional on A321 ONLY
CARGO COMPARTMENT

CARGO FAULT

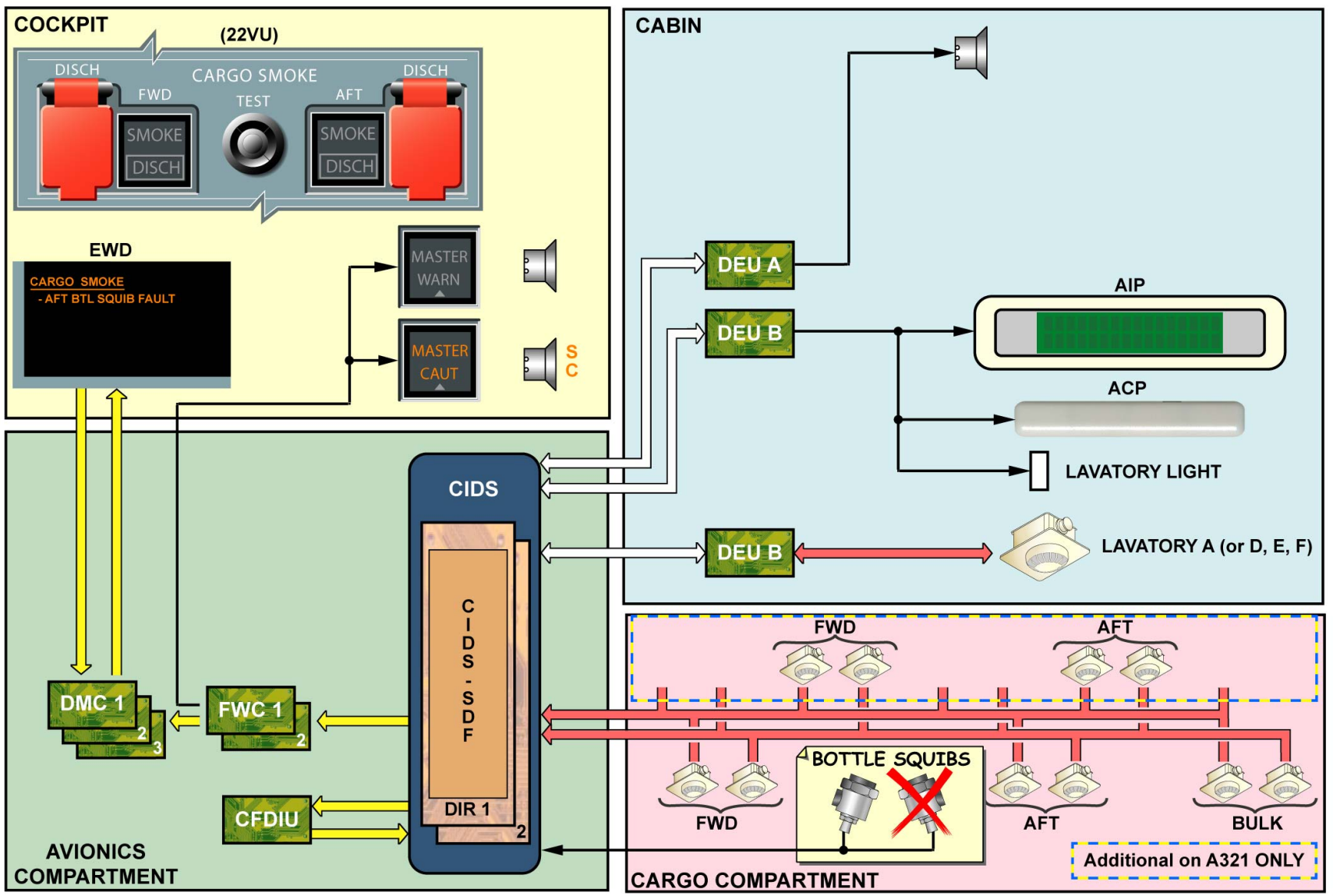
CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

BOTTLE FAULT

In case of a fire bottle pressure drop or a loss of electrical squib continuity, the CIDS-SDF sends signals to the ECAM and to the CFDIU. When a discontinuity occurs on the squib circuit, the following warnings are activated in the cockpit by the FWCs:
- Single Chime (SC),
- MASTER CAUT light,
- ECAM message.

The inoperative squib is also shown on the CFDIU.

UGB13131 - U7ST0M0 - UM26D900000002



BOTTLE FAULT

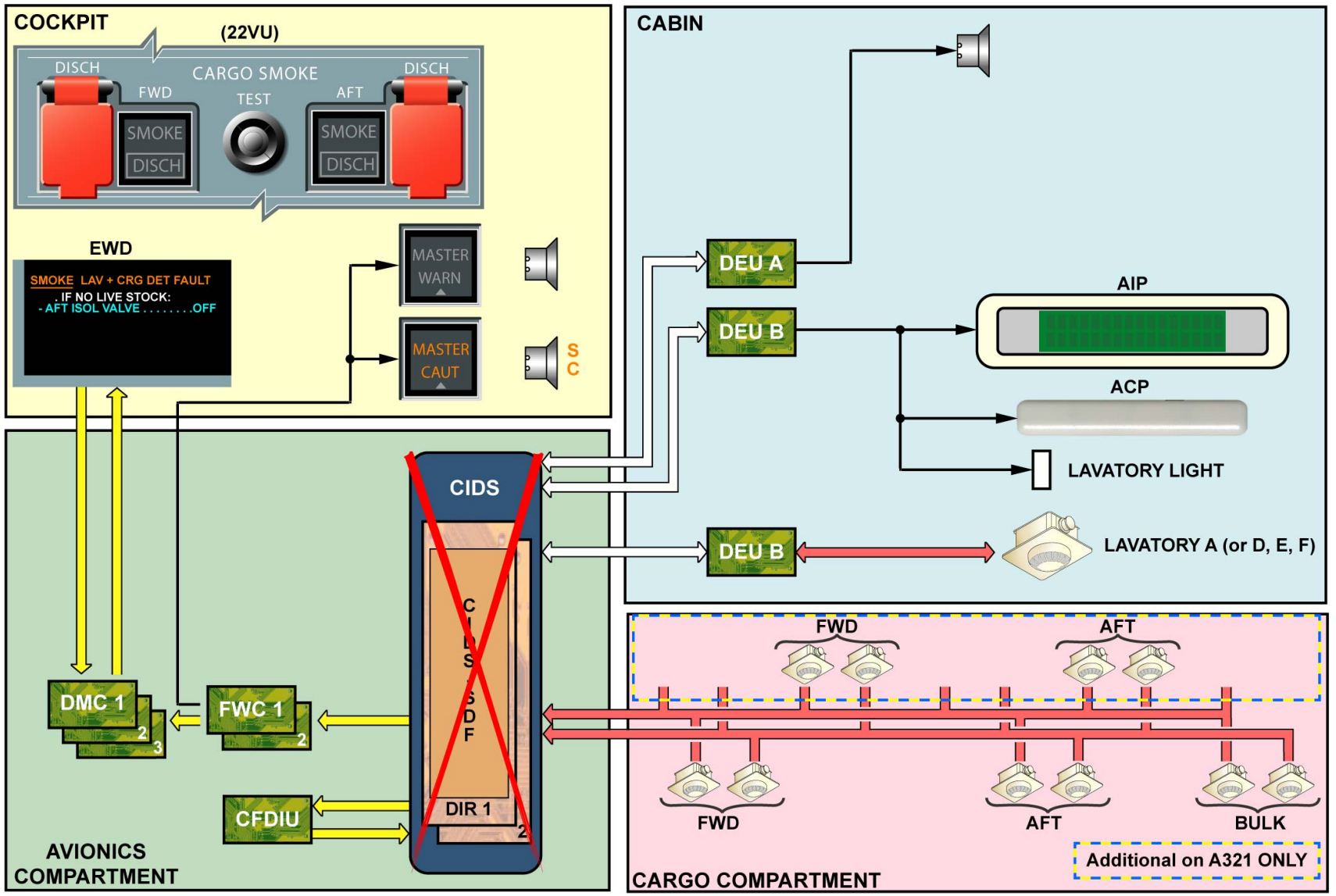
UGB13131 - U7ST0M0 - UM26D900000002

CARGO & LAVATORY SMOKE DETECTION SYSTEM D/O (3)

CIDS SDF FAULT

If one SDF card in one CIDS director fails, the smoke detection function is transferred to the remaining SDF card in the other CIDS director and a status/maintenance message is shown. If the SDF cards in the CIDS director 1 and 2 fails, an automatic fault indication is shown on the Engine and Warning display accompanied by the SC and MASTER CAUT light. The failure message is also sent to the CFDIU.

UGB13131 - U7ST0M0 - UM26D900000002



CIDS SDF FAULT

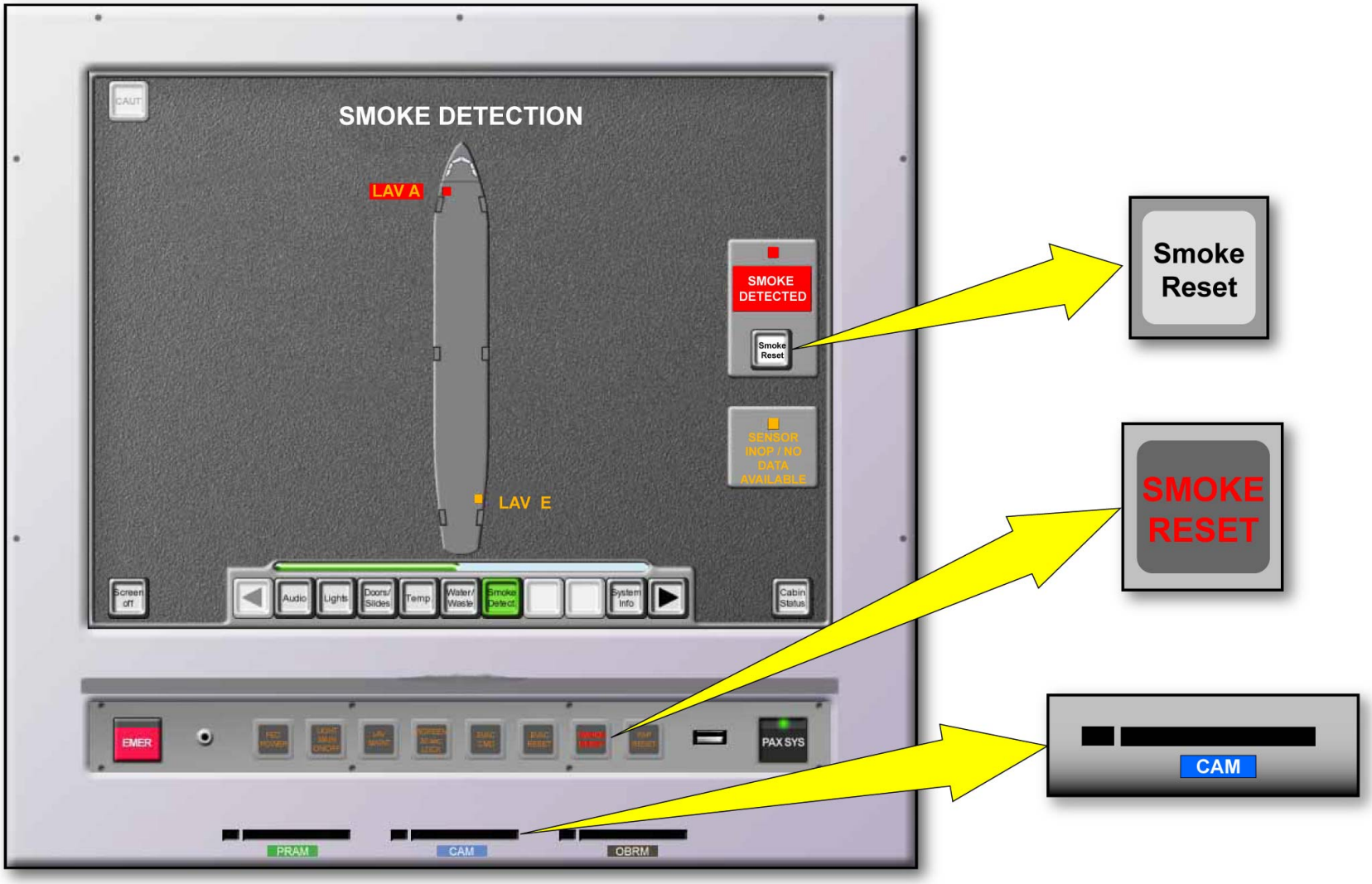
FAP SMOKE DETECTION PAGE (2)

INDICATIONS

The Flight Attendant Panel (FAP) SMOKE DETECTION page indicates cabin related smoke alerts and smoke sensor faults (LAVatory E shown as example). In case of smoke alert (LAV A shown as example) the page will come up automatically regardless of any other previous selected page or FAP function. The following messages shall be indicated:
- smoke alerts with location,
- sensor faults with location,
- smoke signal reset.

If smoke is no longer detected, the Smoke Detection Function (SDF) integrated in the Cabin Intercommunication Data System (CIDS) directors resets all the indications automatically. The visual and aural indications in cabin can be manually reset by pushing the Smoke Reset button on the FAP touchscreen or the SMOKE RESET hard key on the FAP subpanel. A system configuration by plug-in memory cassette, the Cabin Assignment Module (CAM), is installed in the front of the FAP. It defines the smoke detection properties:
- definition of chime distribution,
- definition of Attendant Indicating Panels (AIPs) indications,
- assignments of call lights,
- assignments of Area Call Panels (ACPs) indications,
- assignments of smoke zones reset commands,
- assignments of flashing modes for smoke indications.

UGB13131 - U7ST0M0 - UM26I1000000001



FLIGHT ATTENDANT PANEL

INDICATIONS

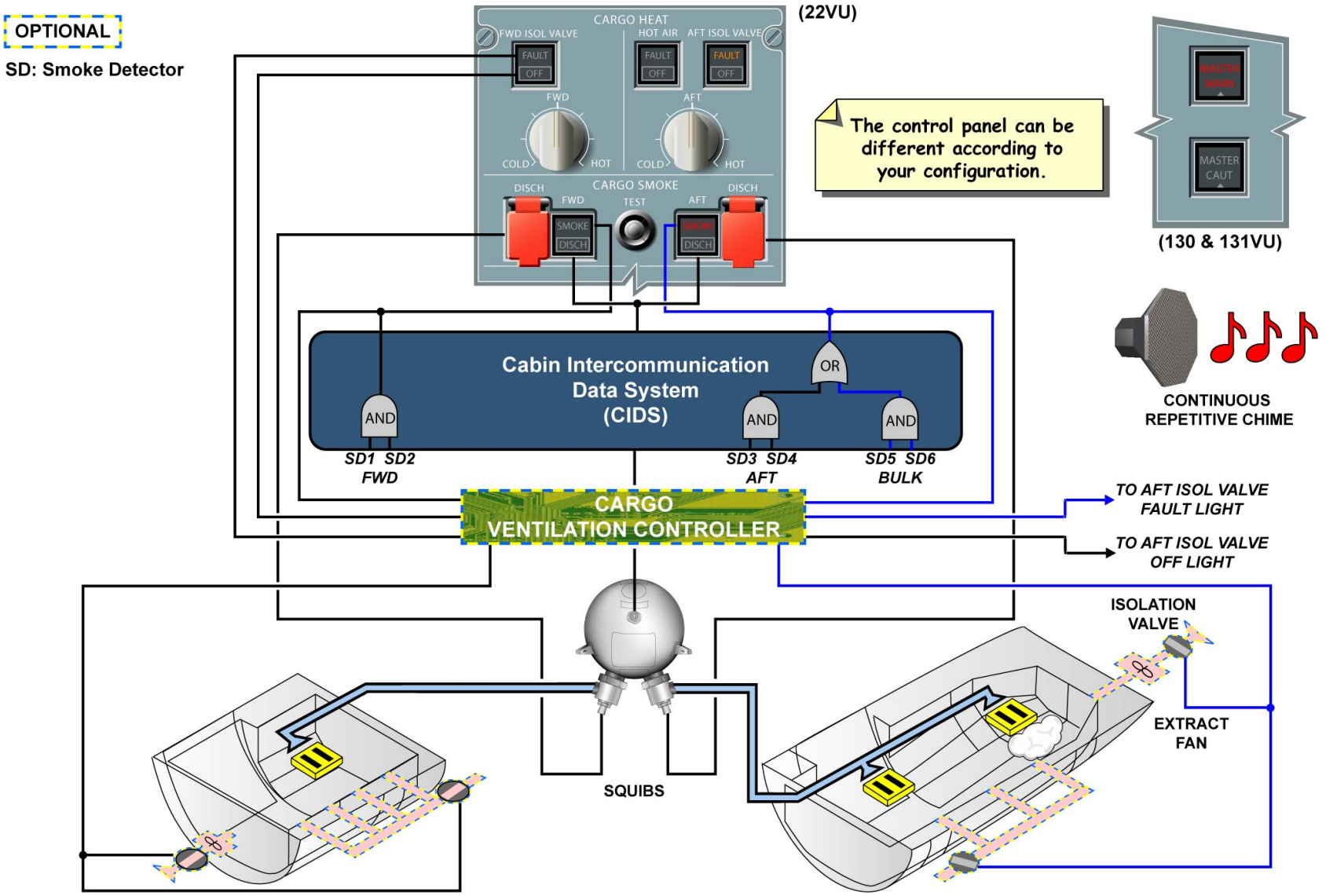
CARGO SMOKE PROCEDURE (3)

AURAL AND VISUAL INDICATIONS

When cargo smoke is detected (bulk smoke is shown as an example), the Continuous Repetitive Chime (CRC) sounds, the MASTER WARNing flashes and the SMOKE light on the CARGO SMOKE panel comes on. The isolation valves of the cargo compartment are automatically closed and the ISOLation VALVE FAULT light on the CARGO HEAT panel comes on.

NOTE: The ventilation and the heating systems are optional and independent for each compartment.

UGB13131 - U7ST0M0 - UM26O600000002



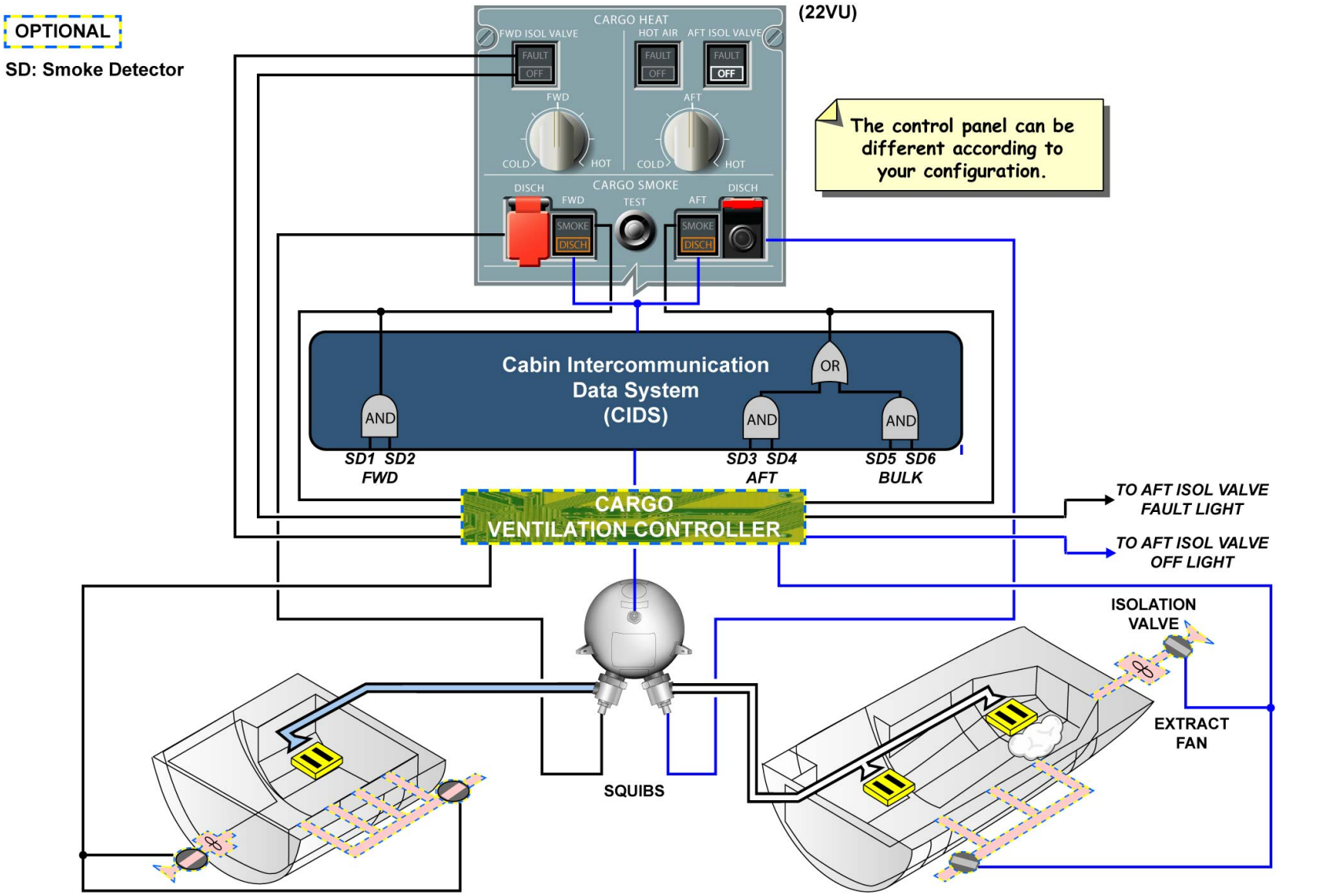
AURAL AND VISUAL INDICATIONS

CARGO SMOKE PROCEDURE (3)

EXTINGUISHING PROCEDURE

The AFT ISOL VALVE P/BSW must be pressed (available only if AFT ventilation system is installed). The isolation valves closure is confirmed. Then, the DISCHarge P/B is pressed for the AFT cargo compartment. When the DISCH P/BSW is pressed, the fire bottle is discharged into the cargo compartment. As the bottle pressure is released, the pressure switch gives the DISCH light activation. With the smoke extinguished, all warnings disappear except the DISCH lights, which remain on.

NOTE: In case of cargo smoke warning on ground you should never discharge the on-board extinguishing bottle. A visual inspection of the cargo compartment must be done. If fire is confirmed, portable extinguishers must be used.



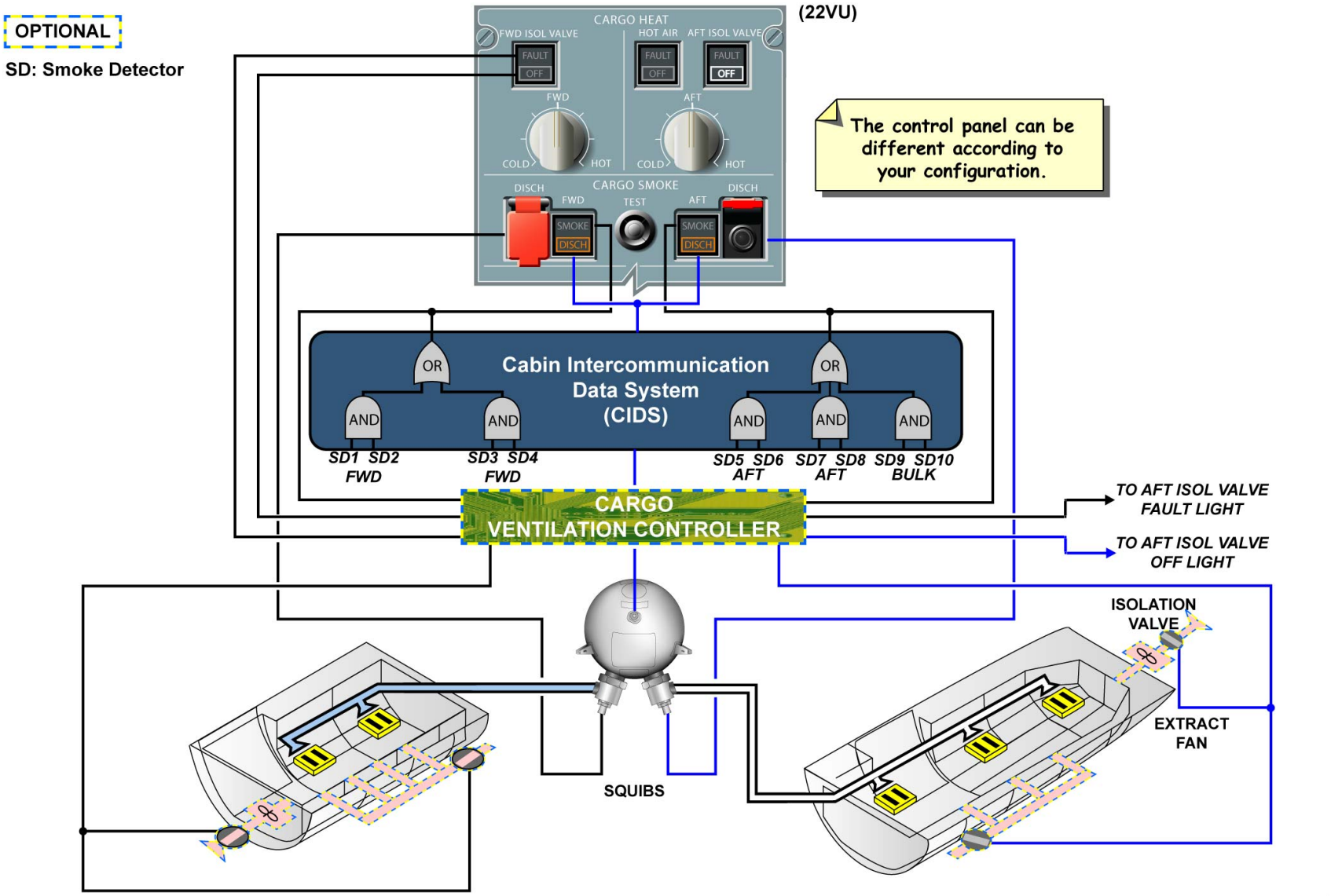
EXTINGUISHING PROCEDURE

UGB13131 - U7ST0M0 - UM26O600000002

CARGO SMOKE PROCEDURE (3)

A321 CONFIGURATION

In case of a cargo smoke detected on the A321 cargo compartment (bulk smoke is shown as an example) the procedure is the same as described for the other single aisle family aircraft. Only the layout of the detection and extinguishing system is different.



A321 CONFIGURATION

UGB13131 - U7ST0M0 - UM26O600000002

PRECAUTIONS (3)

GENERAL

Specific precautions must be taken during removal or installation of a fire extinguishing bottle and a discharge cartridge.

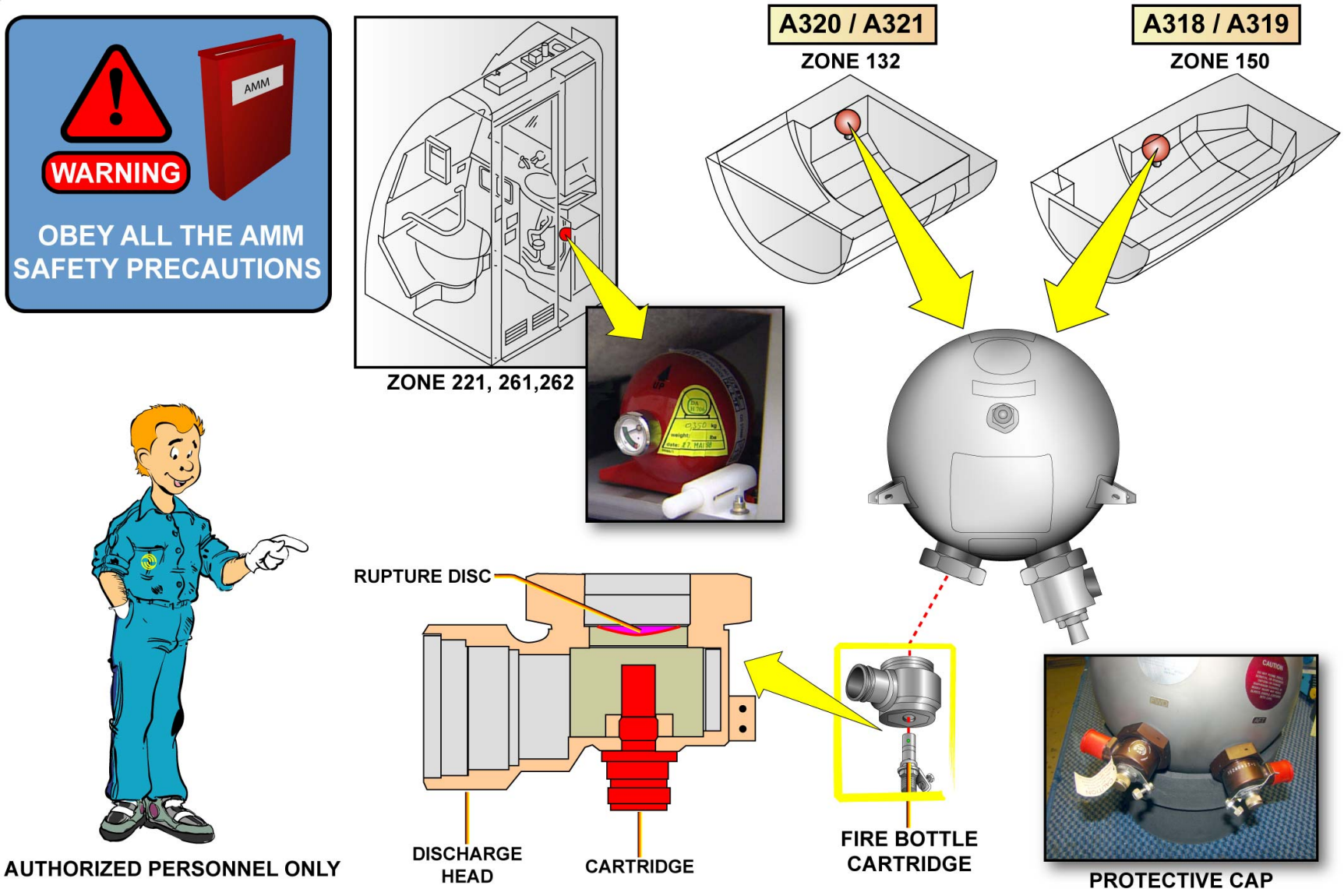
FIRE BOTTLE

WARNING: The fire bottle cartridges are explosive. Remove them before working on the bottle. Protective caps must be installed during bottle removal/installation to prevent damage to discharge diaphragm, which could result in injury to personnel.

DISCHARGE CARTRIDGE

WARNING: Before power is supplied to the A/C, make sure that electrical circuits upon which work is in progress are isolated. Cartridges are class "C" explosives and must be handled or stored by authorized personnel or disposed of by an approved method. When cartridge electrical connectors are disconnected, the cartridge electrical pins must be shunted with a protective shunt which is given by the manufacturer. A shunt plug or shorting clip will prevent bottle discharge which could cause injury to maintenance personnel. The cartridge installed must be supplied by fire bottle vendor and agreed with the specification indicated in the AMM.

UGB13131 - U7ST0M0 - UM26O3000000001



GENERAL ... DISCHARGE CARTRIDGE

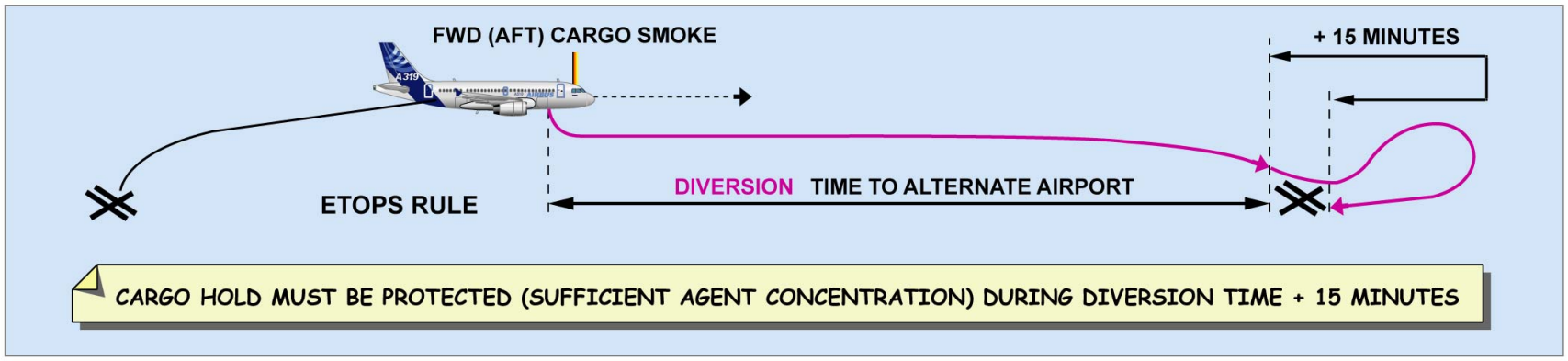
CARGO FIRE PROTECTION FOR ETOPS (OPTION) (3)

ETOPS REQUIREMENTS FOR CARGO HOLD PROTECTION

The ETOPS rules require the A/C to be protected against cargo fire, for the duration of the diversion (120 min, 180 min) with added 15 min supplemental, in the scenario of a go-around requiring a second approach to the alternate airport.
Additional features are installed in order to guarantee sufficient agent concentration for the time of the diversion plus 15 minutes.
Such features with the single shot system configuration, requires:
- a large bottle.

Such features with the dual shot system configuration, requires:
- an additional bottle (two bottles),
- a flow metering system on the second bottle.

UGB13131 - U7ST0M0 - UM26DC000000001


FWD (AFT) CARGO SMOKE
+ 15 MINUTES
ETOPS RULE
DIVERSION TIME TO ALTERNATE AIRPORT
CARGO HOLD MUST BE PROTECTED (SUFFICIENT AGENT CONCENTRATION) DURING DIVERSION TIME + 15 MINUTES

- SINGLE SHOT SYSTEM
- 1 OR 2 BOTTLES
- DUAL SHOT SYSTEM
INSTALLATION OF A FLOW METERING SYSTEM ON THE SECOND BOTTLE
800 cu. in. BOTTLE
630 cu. in. BOTTLE
INSTALLATION OF BOTTLE(S) IN AFT AREA
INSTALLATION OF BOTTLE(S) IN FWD AREA
POSSIBLE FEATURES

ETOPS REQUIREMENTS FOR CARGO HOLD PROTECTION

CARGO FIRE PROTECTION FOR ETOPS (OPTION) (3)

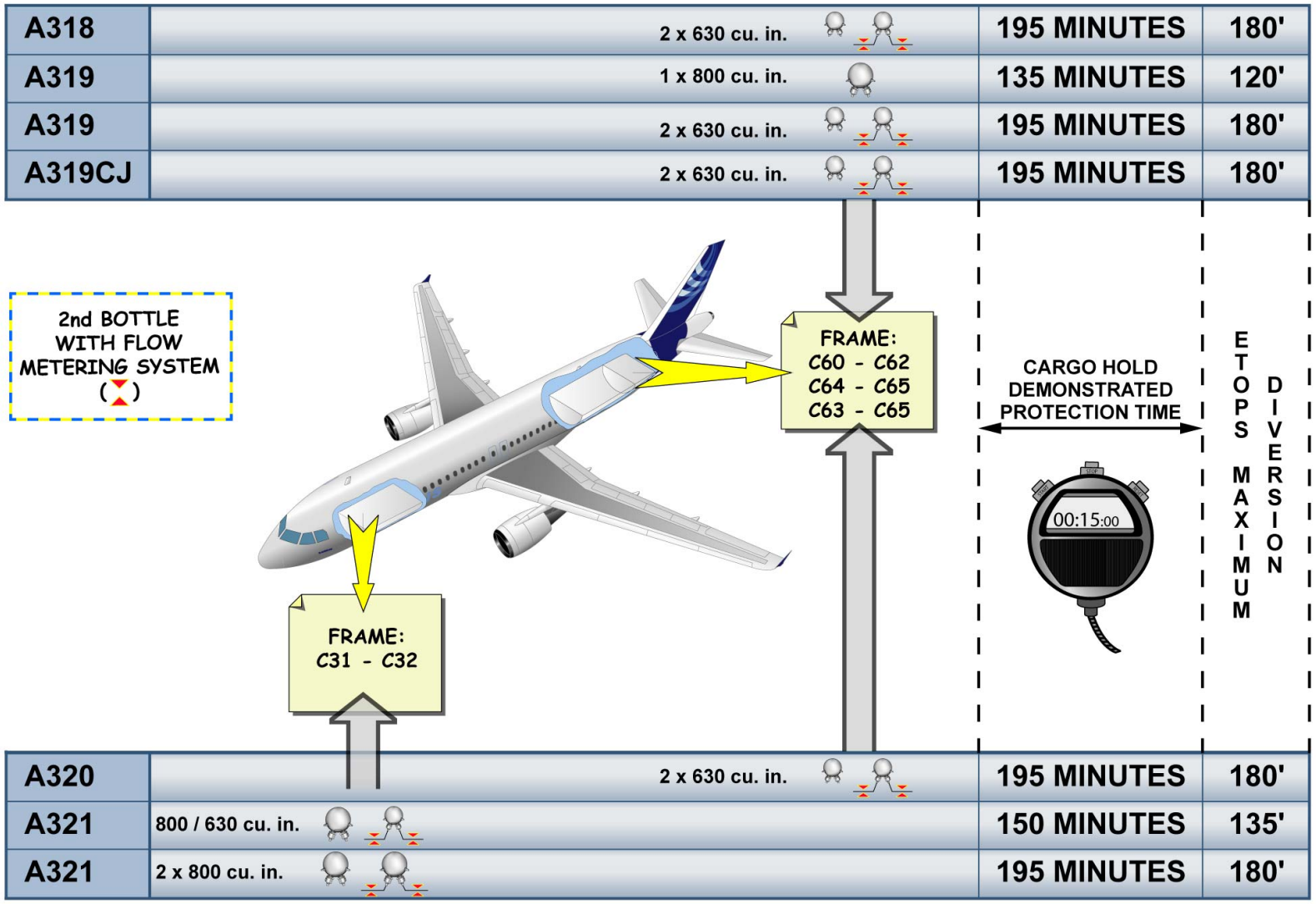
BOTTLE CONFIGURATION TO SATISFY ETOPS 120 OR 180 MIN

Depending on the volume of the cargo holds on the SA family models (A318, A319, A320 and A321) the A/C has:
- for the A318, A319 and the A320, two 630 cu. in. bottles to protect up to 180 min ETOPS,
- for the A319, a single 800 cu. in. bottle, gives/protects a protection up to 120 min ETOPS
- for the A321, two bottles gives/protects a protection up to 135 min ETOPS, extended up to 180 min ETOPS.

Because of the maintenance access constraints in the FWD and AFT cargo holds, particularly with the installation of the ACT on the A319CJ and also on other models, such bottles, squib and flow metering system are installed on the side or AFT of the bulk cargo hold.
The A321 bottles, squib and flow metering system are installed on the side of the FWD cargo hold.

NOTE: The installation of the flow metering system is on the discharge circuit of the second bottle.

UGB13131 - U7ST0M0 - UM26DC000000001



BOTTLE CONFIGURATION TO SATISFY ETOPS 120 OR 180 MIN

UGB13131 - U7ST0M0 - UM26DC000000001

CARGO FIRE PROTECTION FOR ETOPS (OPTION) (3)

DUAL SHOT CARGO SMOKE CONTROL PANEL AND FLOW METERING SYSTEM

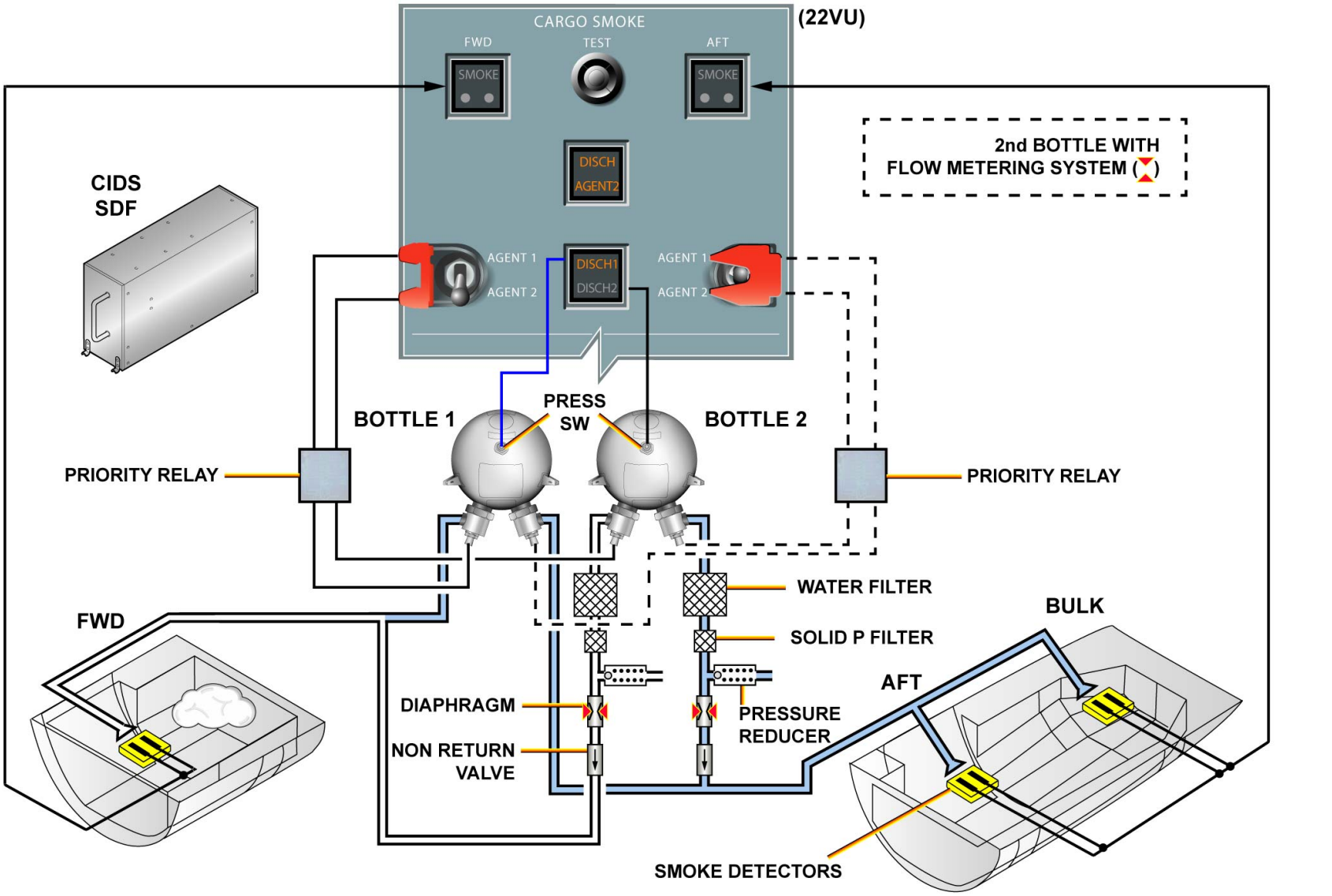
This optional panel 22VU has an additional feature to control the discharge on the second cargo fire bottle, by cockpit crew manual, also called dual shot system.
The ETOPS panel 22VU controls each of the squib on the two bottles.
A priority relay prevents the bottle 2 to be discharged before bottle 1.
The TEST pushbutton switch on the overhead panel 22VU, activates the Smoke Detection Function within the Director (CIDS-SDF), starting an automatic test. Smoke and bottle pressure drop conditions are simulated.
Indications appear on the cargo smoke panel 22VU as follows:
- the FWD and AFT smoke indication lights come on,
- the FWD and AFT discharge indication lights come on.

The smoke detection function in the CIDS-Director (CIDS-SDF) continuously monitors the bottle pressure condition, the cartridges and the wiring. If faults occur, they show on the ECAM upper display unit.
The faults are also transmitted to the Centralized Fault Display (CFDS).
The second bottle equally supplies the FWD and AFT cargo compartment discharge nozzles through an ETOPS flow metering system.
This ETOPS flow metering system is made of:
- a water absorbing filter,
- a solid particle filter,
- a pressure reducer,
- a diaphragm (for flow metering) and non-return valve.

The ETOPS flow metering system makes sure that there is a sufficient concentration in the cargo compartment during ETOPS flight diversion.

NOTE: the second bottle on ETOPS A/C will be discharged through a flow metering system 60 min. after the first bottle.

UGB13131 - U7ST0M0 - UM26DC000000001



DUAL SHOT CARGO SMOKE CONTROL PANEL AND FLOW METERING SYSTEM

FIRE PROTECTION SYSTEM LINE MAINTENANCE (2)

SERVICING

The ENGINE and APU FIRE tests must be performed prior to start.
Press and hold the TEST pushbutton on the Engine or APU fire panel.
The test will trigger all of the FIRE warnings in the cockpit.
During the engine FIRE test:
- FIRE light on overhead panel illuminates,
- FIRE light on engine start panel illuminates,
- both SQUIB lights illuminate,
- both DISCH lights illuminate,
- both red MASTER WARNING lights illuminate on the glare shield panel,
- continuous chime sounds,
- engine FIRE procedure displayed on upper ECAM DU,
- ENGINE page displayed on lower ECAM DU.

During the APU FIRE test:
- FIRE light on overhead panel illuminates,
- SQUIB light illuminates,
- DISCH light illuminates,
- both red MASTER WARNING lights illuminate on the glare shield panel,
- continuous chime sounds,
- APU FIRE procedure displayed on upper ECAM DU,
- APU page displayed on lower ECAM DU.

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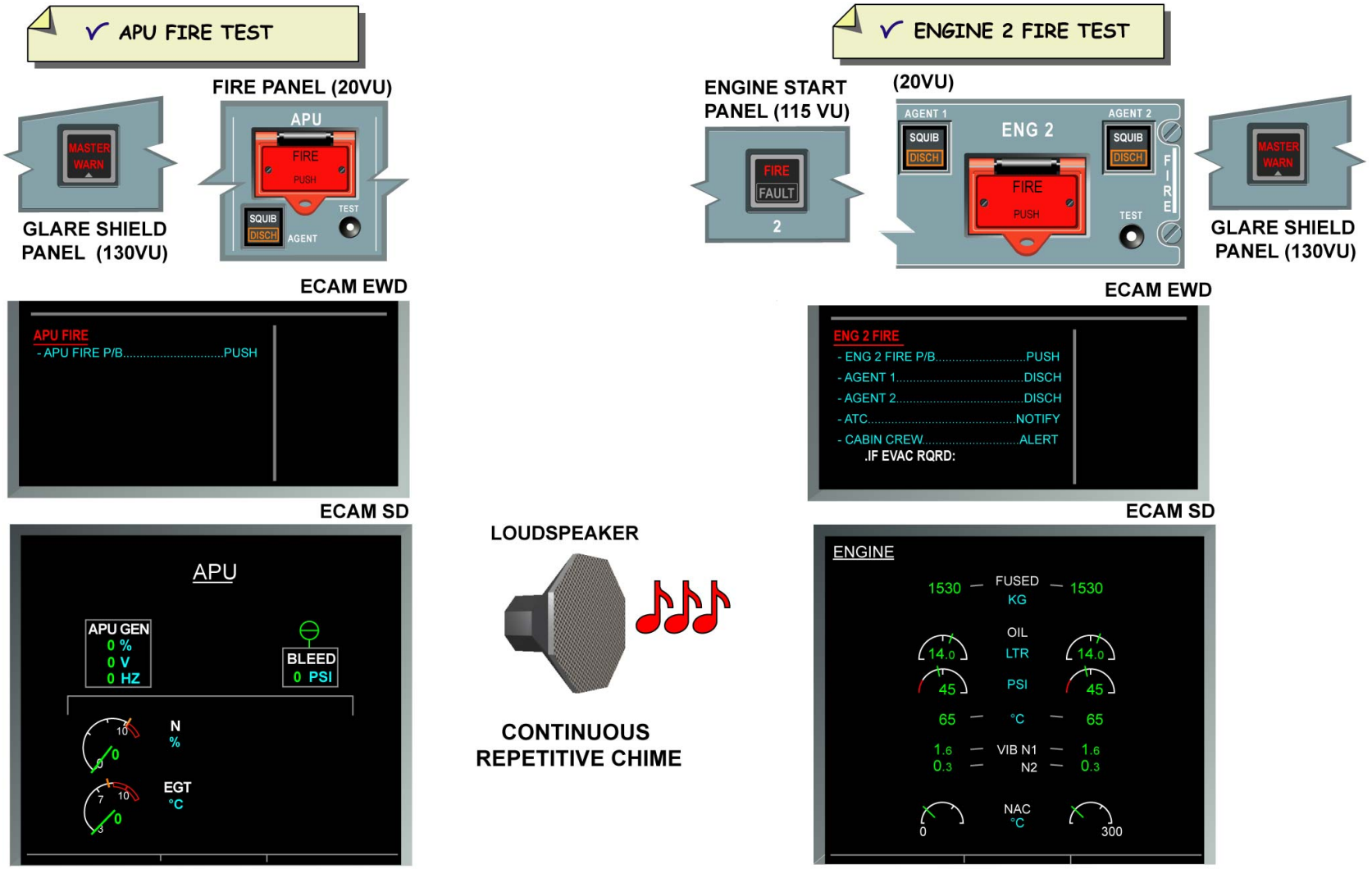
✓ APU FIRE TEST
FIRE PANEL (20VU)
MASTER WARN
APU
FIRE
PUSH
SQUIB
DISCH
AGENT
TEST
GLARE SHIELD PANEL (130VU)
ECAM EWD
APU FIRE
- APU FIRE P/B.....PUSH
ECAM SD
APU
APU GEN
0 %
0 V
0 HZ
BLEED
0 PSI
N
%
EGT
°C
LOUDSPEAKER
CONTINUOUS REPETITIVE CHIME
✓ ENGINE 2 FIRE TEST
ENGINE START PANEL (115 VU)
(20VU)
FIRE
FAULT
2
AGENT 1
AGENT 2
SQUIB
DISCH
ENG 2
FIRE
PUSH
TEST
F I R E
MASTER WARN
GLARE SHIELD PANEL (130VU)
ECAM EWD
ENG 2 FIRE
- ENG 2 FIRE P/B.....PUSH
- AGENT 1.....DISCH
- AGENT 2.....DISCH
- ATC.....NOTIFY
- CABIN CREW.....ALERT
.IF EVAC RQRD:
ECAM SD
ENGINE
1530
FUSED
KG
1530
OIL
LTR
14.0
14.0
45
PSI
45
65
°C
65
1.6
VIB N1
1.6
0.3
N2
0.3
NAC
°C
0
300

SERVICING

FIRE PROTECTION SYSTEM LINE MAINTENANCE (2)

DAILY CHECKS

Each lavatory waste bin is protected from fire by an automatically discharged fire bottle. The bottle is located above the waste bin. The lavatory fire bottle pressure may be checked at the pressure gage on the bottle.

The APU fire bottle is located forward of the APU firewall. Prior to starting the APU, the bottle pressure may be insured by checking the red disc located on the rear fuselage lower left side. The red disc is connected to an overpressure discharge tube. If the bottle pressure becomes excessive, the bottle will discharge to protect the structure and the red disc will blow out.

The cargo compartments should be checked for integrity. Any damage to the cargo compartment ceiling or sidewall liner should be repaired immediately. If the compartment is ventilated, the ventilation isolation valves are automatically closed when SMOKE is detected. A hole in the liner could induce airflow through the compartment, compromising the fire protection of the compartments. If the compartment is not ventilated, no airflow is permitted.

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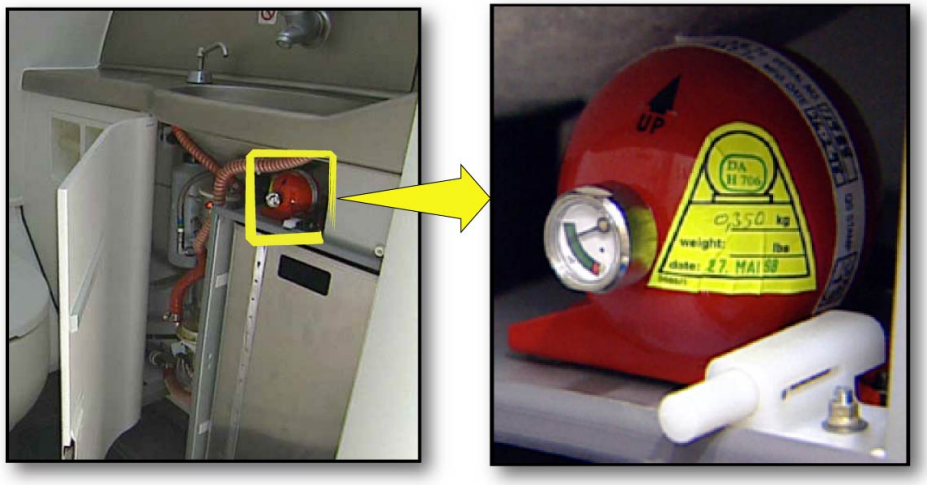
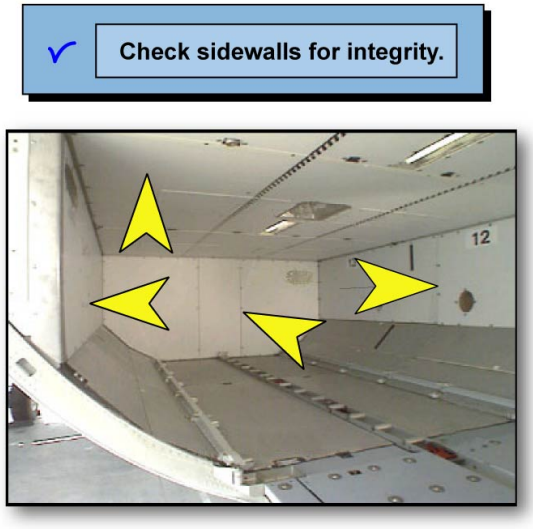
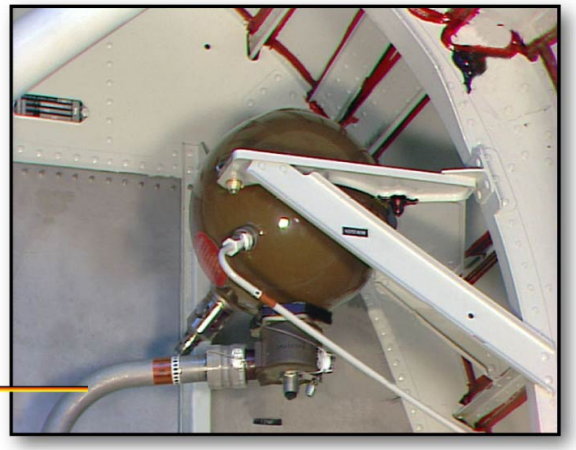


WASTE BIN EXTINGUISHER



FWD CARGO COMPARTMENT



APU FIRE BOTTLE

AIRCRAFT TAIL CONE

DAILY CHECKS

FIRE PROTECTION SYSTEM LINE MAINTENANCE (2)

MEL/DEACTIVATION

The aircraft may be dispatched per the MEL with an engine or APU LOOP A or LOOP B fault. A fire test must be performed to verify the integrity of the other loop. The aircraft may not be dispatched with a FIRE DETECTION fault (A and B loops faulty).
A single cargo smoke detector fault will be indicated by a STATUS message on ECAM. The aircraft may be dispatched in this condition per the MEL.
If both detectors in one cavity are faulty, the aircraft may be dispatched with the compartment empty. The aircraft may be dispatched with the use of the compartments as long as the compartment does not contain inflammable or combustible materials. If the aircraft is equipped with cargo compartment ventilation, the isolation valves must be selected closed. Before each flight, the compartment liner must be checked for condition and integrity.
Each lavatory has a single detector. If this detector fails, the aircraft may be dispatched with the lavatory locked closed and the waste bin empty. The lavatory may be used as long as the extinguisher pressure is verified OK and periodic smoke checks are done by the cabin staff. To lock the lavatory, lift the "LAVATORY" cover plate on the outside of the door and slide the unlocking pin to the LOCK position.

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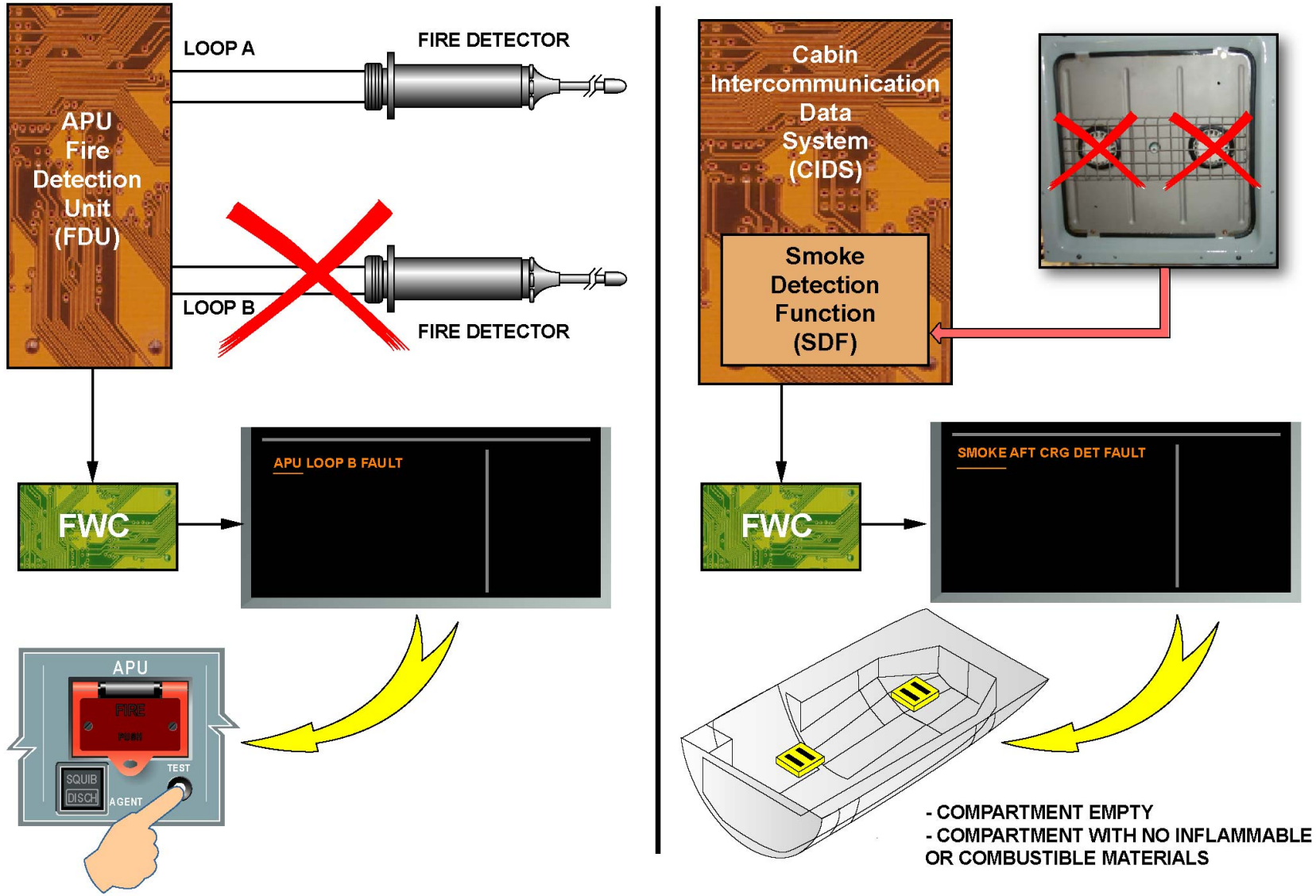
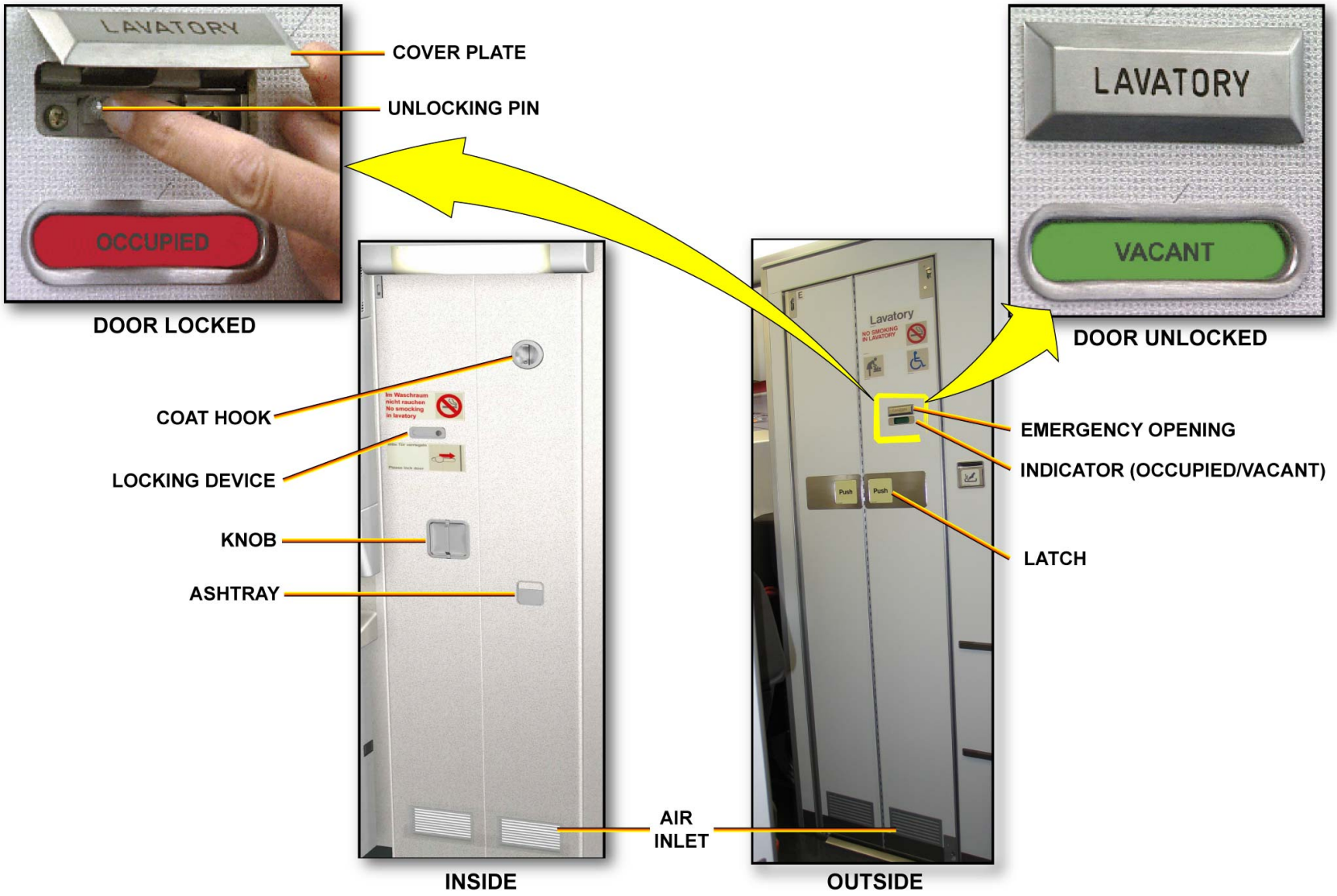


MEL/DEACTIVATION



MEL/DEACTIVATION

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FIRE PROTECTION SYSTEM LINE MAINTENANCE (2)

MAINTENANCE TIPS

The APU auto extinguishing test should be performed every 3000 flight hours. This test will insure that the APU will be protected in case of a fire. When a fire is detected the APU will shut down and the fire bottle will be discharged automatically.
The Auto extinguishing test pushbutton is found on the overhead MAINT panel. The test must be done with the APU shut down but with the master switch selected ON. During the test the APU auto shutdown is simulated and the APU fuel supply valve is closed.
Both squibs of each engine fire bottle No. 1 and one squib of the APU fire bottle are supplied by 28 VDC from the HOT bus. When performing maintenance with the FIRE pushbutton released out, make sure to pull both squib C/Bs to protect against bottle discharge. If the C/Bs are not pulled, the bottle may be discharged even without power on the aircraft.

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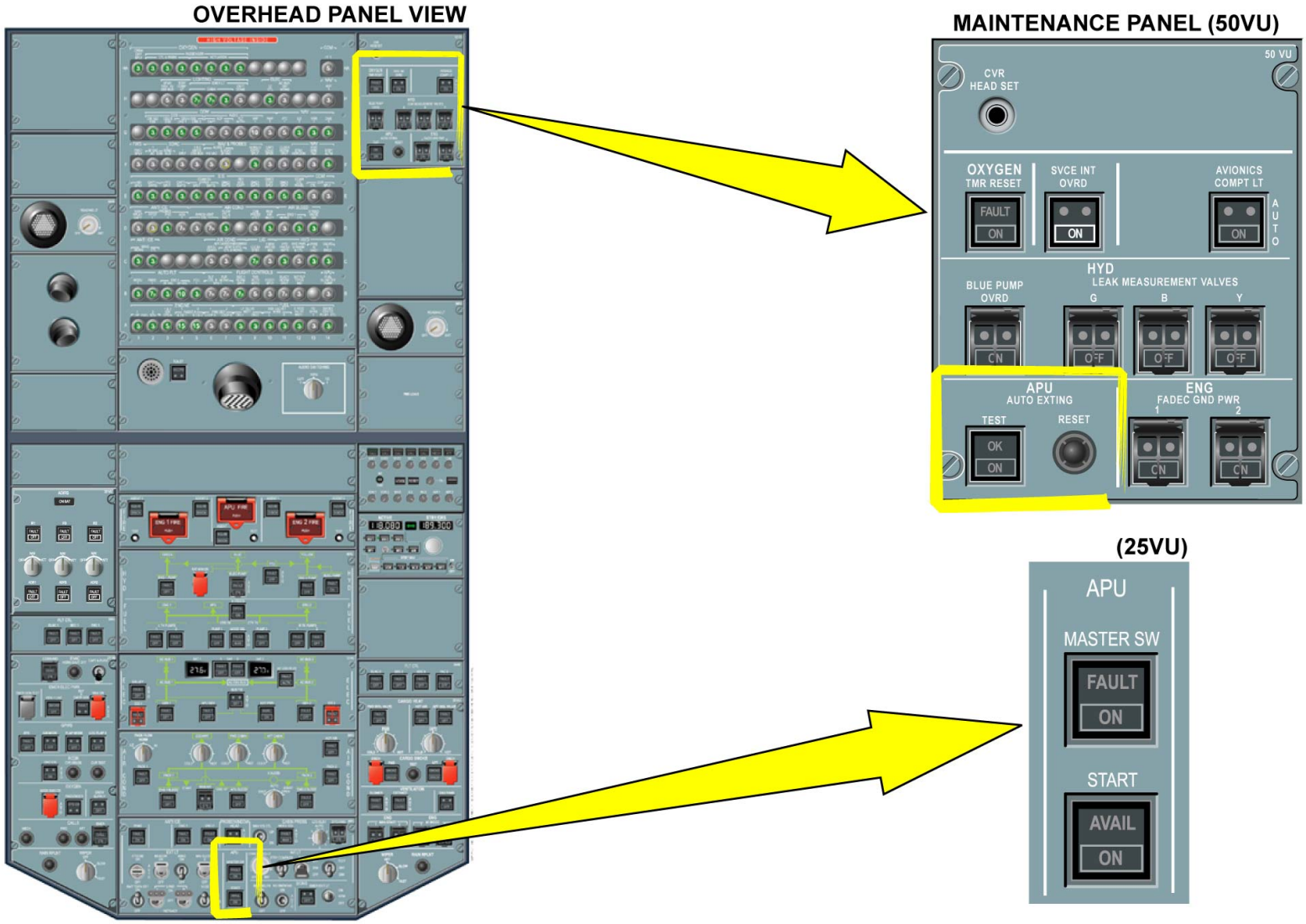

MAINTENANCE TIPS

BUS EQUIPMENT LIST

			NORM		EMER ELEC		
			AC	DC	AC ESS	DC ESS	HOT
ENG/APU	FIRE DETECTION	ENG 1 LOOP A				X	
		ENG 1 LOOP B		DC2			
		ENG 2 LOOP A		DC2			
		ENG 2 LOOP B				X	
		APU LOOP A		DC BAT			
		APU LOOP B		DC BAT			
	FIRE EXTINGUISHING	ENG 1/2					
		BTL 1 SQUIB A					HOT 1
		BTL 1 SQUIB B					HOT 2
		BTL 2 SQUIB A		DC 2			
		BTL 2 SQUIB B		DC 2			
		APU					
		BTL SQUIB A					HOT 1
		BTL SQUIB B		DC BAT			
		AUTO EXT		DC BAT			
CARGO LAVATORIES		FWD/AFT CARGO EXTING BOTTLES		DC BAT			

MAINTENANCE TIPS

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FIRE PROTECTION SYSTEM OPERATION, CONTROL & INDICATING (3)

FIRE DETECTION ENG 1 FIRE LOOP A FAULT

AVIONICS SMOKE DETECTION

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